

TELL *the man who wants* SOMETHING ELSE *to* SELL!

RADIO manufacturers seeking new dealer outlets experienced in the "know how" of selling should tell their story to the refrigeration man. Salesmen, dealers and distributors in this industry have made the remarkable record of a substantial increase in sales during a "depression year." Without the consistent, capable effort of men thoroughly trained in modern specialty selling methods this outstanding record would not have been possible.

But—a simple study of costs reveals this fact. The organization which is geared to do a major selling job when the biggest selling job can be done, must either sacrifice its profit or cut its personnel (or both) in the months when the seasonal trend is down. After building organizations and acquiring personnel which will meet the maximum possibilities of the peak selling season, many distributors and dealers are loath to reduce the scale of their operation. They want something else to sell in order to maintain their

sales force and to provide an attractive income for it and themselves during the entire twelve months of the year.

Here are three reasons why the radio manufacturer can appeal to the refrigeration dealer to sell radio as an additional line:

1. It offers a means of maintaining sales volume over a greater portion of the year.
2. It is adapted to the application of modern specialty selling methods.
3. It is *something else* to be sold to the *satisfied customers* whose confidence the dealer already has gained.

To reach refrigeration dealers from the Atlantic to the Pacific, the radio manufacturer will find *Electric Refrigeration News* a direct and economical medium. Here, in the *News*, he can tell his story to men who *want something else to sell*.

F. W. BRACK, Advertising Manager



ELECTRIC REFRIGERATION NEWS

Registered U. S. Patent Office.

The business newspaper of the refrigeration industry

ISSUED EVERY TWO WEEKS
VOL. 5, No. 4, SERIAL NO. 106

Copyright, 1930, by
Business News Pub. Co.

DETROIT, MICHIGAN, OCTOBER 22, 1930

Entered as second class matter
Aug. 1, 1927, at Detroit, Mich.

FIFTEEN CENTS PER COPY
TWO DOLLARS PER YEAR

N.E.L.A. PLANS \$5,000,000 CAMPAIGN

"FULL SPEED AHEAD" SLOGAN AT DETROIT KELVINATOR MEETING

Record Sales in 1931 Forecast by
Enthusiastic Distributors

Detroit, Mich.—An air of quiet but effective confidence was the dominating note of the Kelvinator Convention held here October 13 and 14. The remarkable progress made by Kelvinator this year was hailed as an augury of what 1931 holds in store. Ballyhoo was among the missing from the convention sessions. From start to finish it was a business story cleverly and forcefully told, with just enough of the spice of humor here and there to keep the hard work atmosphere from becoming oppressively dominant.

About 600 men, distributors, branch managers, field force, district managers and foreign representatives came to Detroit for the two-day session. They saw the extensive line which Kelvinator will offer to the public in 1931, discussed sales policies from every angle, renewed their acquaintance with Kelvinator executives, and went back home ready and willing to make next year the best in the company's history.

"Full Speed Ahead" was the convention slogan, and the theme of George W. Mason, president of the Kelvinator Corporation, when he talked to the big crowd. The business sessions were held in the Little Theatre, only a few blocks from the convention headquarters at the Hotel Statler, where the annual banquet, with an attendance of about 800, was held on the evening of October 13.

Mayor Frank Murphy of Detroit was on hand to extend the city's welcome when the convention began on Monday morning. He was followed by H. W. Burritt, vice-president in charge of sales, who was in general charge of the convention, and whose introductions of the long list of speakers were excellent proofs of the fact that the right sort of chairman can find something just a little different to say about every man he brings forward.

After President Mason had made the first of his three speeches during the two-day period, the two sales managers, J. S. Sayre and J. M. Fernald, took charge. The former told about the new features of the domestic line, and the latter went into considerable detail in regard to the expansion of commercial activities next year. As he concluded his remarks, the curtains were drawn back and revealed the new Kelvinator line in all its glory.

Advertising was the main theme on Monday afternoon. Among those who spoke and told of the company's advertising plans were W. S. French and E. L. Triffitt, both of Brooke, Smith & French, Kelvinator's advertising agency, A. M. Taylor, advertising manager, and Vance Woodcox, director of sales promotion. The session closed with a play-let acted by Kelvinator employees. The youthful hero, despite one embarrassing moment, when he declared that his methods would "cut sales and double costs," succeeded in modernizing his employer's business with the efficient aid of the Kelvinator district manager, who always turned up at the opportune moment.

The banquet on Monday evening was
(Concluded on Page 12, Column 2)

MAJESTIC DISTRIBUTORS DISCUSS REFRIGERATION

Chicago, Ill.—From all parts of the nation Majestic radio distributors flocked here Wednesday, October 8, to hear the story of the new Majestic refrigerator.

W. C. Grunow was the dominant figure in the executive sessions, held at the Lake Shore Athletic Club. He discussed the present radio situation, told the history of the new refrigerator, and demonstrated it side by side with Frigidaire and General Electric models.

The three-and-one-half cubic feet box, intended for apartment house use, was on display, as well as a model decorated
(Concluded on Page 4, Column 4)

MAJESTIC vs. GIANTS

Harrison, N. J.—Determined to wage war against the giants, the Grigsby-Grunow Co. of Chicago, which manufactures Majestic radios and electric refrigerators, caused papers to be served here October 14 in its \$30,000,000 damage suit against RCA, General Electric, and Westinghouse.

The complainant, charging that the defendants control more than 4,000 radio patents through an alleged unlawful cross-licensing combination, declares actual damages of nearly \$10,000,000; but because of the provisions of the anti-trust acts seeks a total of \$30,000,000.

Rounding the Corner

SOME three months ago the NEWS introduced to its readers a brand new type of "Buyer's Guide."

The first five of these "pink sections" have dealt with products which are interesting chiefly to dealers and distributors. This cycle concluded, the Buyer's Guide rounds the corner and begins discussing subjects which primarily concern the manufacturer. Metals provide the topic for the present issue. In the next will be presented Production and Service Tools.

Westinghouse on Parade



Camden, New Jersey Sees Refrigerator Glide By

REX COLE COOPERATES WITH N. Y. EDISON GROUP

New York, N. Y.—A Winter Prosperity Convention is the Rex Cole organization's contribution to the industry. A banquet and dance held at the Commodore on October 9th officially launched a huge co-operative refrigerator sales campaign, in which the New York Edison and associated companies and the Rex Cole organization plan to use the "President's Plan," to sell 20,000 refrigerators in the ten weeks starting October 9 and ending December 18. The slogan of the campaign is "Don't Go Through Another Winter Without an Electric Refrigerator."

Matthew S. Sloan, president of the New York Edison System, presented the "President's Plan," pledging the support of the 35,000 employees of the Edison companies. This message to his employees, taken from an elaborate booklet, is as follows:

"To All Employees of the New York Edison System:

"Starting Thursday, October 9, 1930, the companies comprising the New York Edison System enter what is planned to be the greatest sales activity in the history of electric refrigeration. During a ten weeks' period we are asking our employees to participate in a campaign to sell 20,000 electric refrigerators.

"As an immediate benefit to our employees planning to own an electric refrigerator, there have been made possible the easiest purchase terms ever arranged for this great convenience. You not only obtain the down payment free, but a special liberal discount, plus two years in which to pay.

"We believe every man and woman in this organization will have rightful pride and satisfaction in bringing about

the success of this plan, further details of which are explained in this booklet. I am confident that with everyone contributing his or her individual support, we can carry this campaign to success."

The companies participating are New York Edison Company, Brooklyn Edison Company, United Electric Light and Power Company, New York and Queens Electric Light and Power Company, Electric Light and Power Company, and the Yonkers Electric Light and Power Company.

Rex Cole presided at the banquet, and by virtue of his humor and interesting introductions managed a long program without the loss of interest of any in the large gathering.

Merlin H. Aylesworth, president of the National Broadcasting Company; Paul S. Clapp, managing director National Elec-

(Concluded on Page 4, Column 4)

ELECTRO-KOLD EXPORTS HELP TO SET NEW RECORD

Spokane, Wash.—Shipments during the month of September by the Electro-Kold Corporation exceeded shipments for the same month in 1929 by more than 47 per cent. E. S. Matthews, sales manager for Electro-Kold, attributes this gain to the volume of business obtained on the Pacific Coast and the aggressive foreign distribution campaign which his company has pursued since August.

"The demand for Electro-Kold products in South America," Mr. Matthews said, "has been very good, and we have made some very sizeable shipments. General business conditions on the Pacific Coast are good, and there seems to be a very pronounced revival of building activity."

Refrigeration to Rank as Major Activity in Next Three Years

New York, N. Y.—The National Electric Light Association's plan to make refrigeration a major activity in 1931, which was announced in the June 18th issue of the News while the N. E. L. A. Convention was in session in San Francisco, has taken definite shape. A three-year program which calls for an expenditure of \$5,000,000 for advertising and promotion, has been set up, and two men prominent in the electrical industry are now in active charge of the work.

James E. Davidson, president of the Nebraska Power Company and former president of the N. E. L. A., is national chairman of the Electric Refrigeration Bureau, which has been created as a part of the Commercial National Section. Dr. George W. Allison, of Chicago, has taken charge of the Refrigeration Division's work at the New York office of the N. E. L. A. He will devote all of his time to refrigeration activities.

An executive committee consisting of leaders in the refrigeration industry has been appointed, and regional directors have been put in charge of the campaign in their respective districts.

A plan book prepared in consultation with Lord, Thomas & Logan, advertising agency, has been prepared and will soon be ready for distribution. The campaign is expected to put 1,000,000 domestic electric refrigerators into service during 1931. The members of the executive committee are:

W. R. Putnam, Electric Bond and Share Co., New York, N. Y.; C. J. Eaton, Middle West Utilities Co., Chicago, Ill.; H. C. Cummings, Byllesby Engineering & Management Corp., Chicago, Ill.; T. F. Kennedy, Henry L. Doherty & Co., New York, N. Y.; L. R. Parker, Consumers Power Company, Jackson, Mich.; D. M. DeBard, Stone & Webster Corporation, Boston, Mass.; H. M. Sawyer, American Gas and Electric Corp., New York, N. Y.; F. D. Pemberton, Public Service Electric & Gas Co., Newark, N. J.; C. E. Michel, Union Light and Power Co., St. Louis, Mo.; Carl Taylor, Westinghouse Elec. & Manufacturing Co., Mansfield, Ohio; P. B. Zimmerman, General Electric Co., Cleveland, Ohio; H. C. Burritt, Kelvinator Corporation, Detroit, Mich.; J. A. Harlan, Frigidaire Corporation, Dayton, Ohio.

The Regional Directors for the activity are:

New England Division—C. L. Edgar, Edison Electric Illuminating Co., Boston, Mass.; Eastern Division—H. P. Liversidge, Philadelphia Electric Co., Philadelphia, Pa.; Great Lakes Division—John F. Gilchrist, Commonwealth Edison Co., Chicago, Ill.; East Central Division—L. B. Herrington, Kentucky Utilities Co., Louisville, Ky.; Middle West Division—L. O. Ripley, Kansas
(Concluded on Page 4, Column 4)

SIMPLICITY IS KEYNOTE OF NEW SERVEL MACHINE

Evansville, Ind.—Persistent rumors of the development of a new type of domestic electric refrigerator by Servel have recently taken concrete form. A working model was shown to a small group at French Lick during the recent N. E. L. A. sectional convention. The delegates showed much interest in the model.

Mechanical details of the new Servel are not yet available but it is reported that the new unit is hermetically sealed, with the high-side in the base of the cabinet. The working parts have been simplified and float valves, expansion valves, gears, fans are said to have been eliminated.

The entire unit can be removed from the cabinet by one man equipped with a screwdriver. All service work will be done at the factory.

The cabinet seen at French Lick was attractive and the impression is that prices will be in line with competitive models. Actual production is under way, the Evansville plant having been redesigned to handle the new model.

While the principal feature of the new Servel is its simplicity, several new automatic features have been included. More definite details will be available within the next few weeks.

GENERAL MOTORS RADIO ALLIED WITH FRIGIDAIRE

Dayton, Ohio—Increased profits for many Frigidaire dealers through expansion of their franchise to include sales rights for the General Motors radio, are seen in the announcement of a sales alliance between Frigidaire Corporation and General Motors Radio Corporation.

That sales of radios will bolster up the winter sag in the electric refrigerator business, is the opinion of E. G. Biechler, president and general manager of Frigidaire Corporation, and R. J. Emmert, president of General Motors Radio Corporation. Likewise, they feel, sales of electric refrigerators will keep business stable for the radio dealer during the spring and summer months, when he experiences his seasonal lull.

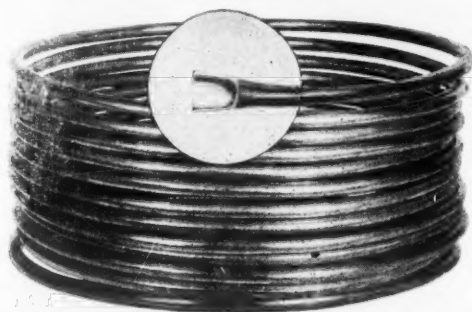
The selling alliance between the two General Motors subsidiaries is a practical application of these ideas. Not only will it enable dealers to map out a fast-moving, year-around sales program for these two lines of merchandise, but it will help stabilize employment and make for lower distribution costs, Mr. Biechler and Mr. Emmert explain.

They point out that electric refrigerators and radio receivers are good complementary lines, because their peak sales are recorded at different seasons. They call attention to additional features which the two lines have in common, from the standpoint of sales. They are purchased by much the same type of prospects, and they are sold in much the same manner and by the same type of sales persons. The electric refrigerator dealer or the radio dealer can take on the opposite line without radically altering his present set-up.

Process of amalgamating the General Motors Radio and Frigidaire dealer or
(Concluded on Page 16, Column 1)

DEHYDRATED WOLVERINE SEAMLESS COPPER TUBING

Highest quality seamless copper tubing—perfectly dehydrated and solder-sealed—made to A. S. T. M. Specifications (B-68-30-T)—ready for quick installation. Send your production requirements for quotations, or wire for rush shipment from stock.



WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

1491 Central Ave. Detroit, Mich.

Phone Cedar 5000

Export Department—H. M. Robins Company,
120 Madison Avenue, Detroit, U. S. A.
Cable Address: Robins, Detroit

Sales offices in all major cities. Stock available at Los Angeles,
224 E. 11th St. Write or wire for name of nearest representative.

GEORGIA POWER'S ATTACK SMOTHERS OLD MAN QUOTA

Atlanta, Ga.—Georgia Power Company's affinity for taking "old man quota" for a ride ran true to form in the fall refrigeration campaign which closed on October 4. After all outlying posts were heard from, the net results of the drive were found to total \$390,026.00, or 111.4 per cent of the quota. The refrigeration men, like Georgia's football team skirting the Yale ends, pushed down the field to score on Quota by outfighting Quarterback Depression. For the Georgians good gains were made by M. I. Hamm, sales supervisor; Leonard Campbell, Macon district sales supervisor; J. T. Cates, Rome district sales supervisor; J. R. Vansant Statesboro district manager; F. F. Starr, Jr., Milledgeville; F. M. Biggers and K. M. Townsend, both of Atlanta.

The campaign opened on September 8 and no time was lost in assailing the \$350,000 quota. Four of the six sales divisions turned in more than 100 per cent of their quotas. General Electric domestic and commercial refrigerators and Kelvinator commercial equipment were featured.

MAJESTIC IN BALTIMORE WITH YEAGER IN CHARGE

Baltimore, Md.—The new Majestic electric refrigerator, product of the Grigsby-Grunow Company of Chicago, has been received by the Eisenbrandt Radio Company, Inc., Paca and Pratt Streets, Baltimore, Md., distributors for the Majestic products in Maryland, parts of Virginia, West Virginia and Delaware, and the District of Columbia. It will have exclusive distribution of the

Majestic refrigerator in these territories. In addition to its headquarters in Baltimore, Md., the Eisenbrandt concern maintains an office in Washington, D. C. H. Wilson Yeager, formerly of the Grigsby-Grunow Company of Chicago, has been appointed sales manager of the Eisenbrandt Radio Company, Inc.

Mr. Yeager has been connected with the Majestic sales school at Chicago as business manager, and served on the faculty as instructor in refrigeration since late in 1929. He has spent several years in experimental and research work with refrigerants and their cooling possibilities. Mr. Yeager has had some wide merchandising and sales promotional experience, having operated a chain of his own stores in New England States for several years, and was the former general sales manager of the Musical Instrument Sales Company, which operated in large department stores from St. Louis to New York.

COPELAND EXPORTS SHOW GOOD GAINS OVER 1929

Mt. Clemens, Mich.—Export shipments of Copeland electric refrigerators for the first six months of 1930 showed a gain of approximately 16½ per cent over the first half-year of 1929, according to a report just issued by C. W. Hadden, of the Copeland Sales Company.

Copeland refrigerator export sales are handled by the H. M. Robins Company of Detroit, who anticipate an equally good showing for the latter half of 1930, when the final records are compiled.

Copeland is now sold in 27 foreign countries, exclusive of Canada.

HEAVY SELLING BOOSTS SIZE OF ORDER

New York, N. Y.—Max Oestricher, entered the show room of Rex Cole, Inc., 265 Fourth Avenue, to purchase a General Electric refrigerator for his home. However, Harold C. Caspers, assistant manager of the distributor's apartment house department, so completely sold Mr. Oestricher upon the advantages of refrigeration that he signed an order for twenty model S-42's with which to equip an apartment house owned by him at 650 E. 21st Street, Brooklyn.

REFRIGERATOR PROMINENT AT BIG CALIFORNIA FAIR

Sacramento, Calif.—Through the novel use of amplifiers, thousands of California housewives, attending the California State Fair recently, were informed of the advantages of refrigeration.

Two public address systems on the grounds were used to keep the crowds informed as to where to find the General Electric refrigerator booth and as to the benefits of electric refrigeration. The booth and stunt was staged by the L. H. Bennett Company, San Francisco distributors.

An exceptionally large display booth was arranged, providing in all 1,400 square feet of floor space in which 23 refrigerator models, including the complete commercial line, were displayed. Twelve salesmen of the Sacramento office were in attendance at the fair booth, six men being in each shift, with seven-hour shifts. It was estimated that 400,000 people attended the fair, and naturally the refrigeration booth attracted a lot of them.

As to results, sixty-four sales were closed during the fair week, including one CS-450, one CS270 and one DP1 water cooler. Approximately 500 prospects competed for prizes offered. Miss Lauretta LaMarr, home service director for the Bennett Company, with the help of Miss Ruth Mencke, of the Phillip Floor Company, conducted two cooking schools a day, sponsored by food manufacturers and other merchants. Hundreds of housewives attended these schools, which also were broadcast over a microphone two hours each day. Miss LaMarr talked on food preservation and General Electric refrigeration.

During the fair ten refrigerators were loaned to charitable organizations and carried signs telling the crowds where to find the big refrigeration display. This use of the refrigerators was the subject of much favorable comment by visitors.

Each month the Junior Toppers of the Bennett Company have been called into San Francisco from their localities to some kind of a meeting or for some kind of entertainment as recognition of the sales efforts. The Junior Toppers for August were taken to the State Fair in a body in a large bus.

100% VERTICAL SURFACE PATENTED

LARKIN COILS

FOR ELECTRICAL REFRIGERATION

Standard Factory Equipment LARKIN Patented COILS

Solve Electric Refrigerations Greatest Problems

Absopure
DETROIT, MICH.

Copeland
DEPENDABLE Refrigeration
DETROIT, MICH.

WILLIAMS' ICEOMATIC
REFRIGERATION
BLOOMINGTON, ILLINOIS

SERVEL
Electric Refrigeration

B-K, Junior
New Brunswick, N.J.

KULAIR
PHILADELPHIA, PA.

Electric-Automatic REFRIGERATOR
PHILADELPHIA

POTTER
PORTLAND, O.

Zerozone
Lifetime Refrigeration

UNIVERSAL
DETROIT, MICH.

Wayne
FORT WAYNE, IND.

JACK FROST
REFRIGERATION, INC.
TORONTO-CANADA

Larkin Coils covered by United States Patent 1776235. Notice is hereby published that Larkin-Warren Refrigerating Corporation intends to protect its Patent Rights.

TRUPAR
DAYTON - OHIO

They banish De-hydration and Defrosting Problems and eliminate the costly Problem of Servicing

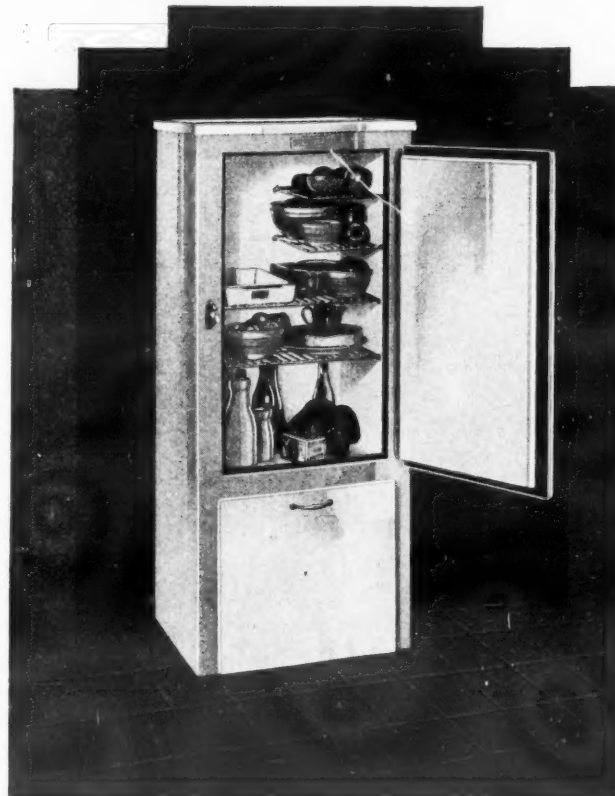
You may be sure that these manufacturers made exhaustive tests before adopting LARKIN 100% Vertical Surface Dry Expansion COILS as standard factory equipment. These COILS on test prove that they banish the hitherto perplexing problems of de-hydration and defrosting and by virtue of their efficiency, simplicity and constant uninterrupted service they have reduced the expensive problem of servicing to such a low point that it is now negligible. The LARKIN (Patented) COIL is a stand-out for efficiency in the field of commercial electric refrigeration. Facts and data from above manufacturers or from us.



One of a large line of sizes adapted to every conceivable type commercial case, cooler, etc., on the market.

LARKIN-WARREN REFRIGERATING CORPORATION
ATLANTA Originators and Manufacturers GEORGIA

The Super Ice Man



Hartford, Conn.—Super Oil dealers in all parts of the United States are displaying the new Super Ice Man, the electric refrigerator now being marketed by the Super Oil Heater Co., which has its headquarters at 275 Connecticut Blvd. here.

The Super Ice Man has an all-steel cabinet, interior and exterior of the cabinet being of porcelain. The small-size model has a total capacity of 5.57 cu. ft. The medium-size cabinet, all porcelain, has a total capacity of 6.33 cu. ft. The large size has two doors. It is an all-porcelain cabinet with a total capacity of 7.40 cu. ft. The lower shelf bracket is arranged to give plenty of space for tall milk bottles. The hardware is of designed die cast steel, chrome plated.

Because of its construction the Super Ice Man uses a 1/6 horsepower motor, which has been found ample for this job. The condensing unit is mounted on cushion rubber to absorb vibration. Both the cooling and condensing units are easily removable from the cabinets. Two trays in the cooling unit hold 46 cubes of ice at a single freezing.

Three water coolers, two of pressure type and the other bottle type, are included in the Super line.

Super Oil by this move joins the organizations that are combining the oil burner business with refrigeration.

NEW ADJUSTABLE RANCO CONTROL



Provides an
Ideal Temper-
ature Range
on Household
Refrigerator

The Ranco Control for 1930 has many refinements and basic improvements which make it more than ever the ideal control for the modern household refrigerator.

WRITE FOR
INFORMATION

**The Automatic Reclosing
Circuit Breaker Co.**

COLUMBUS, OHIO

U. S. A.

*Show them how
it helps pay*

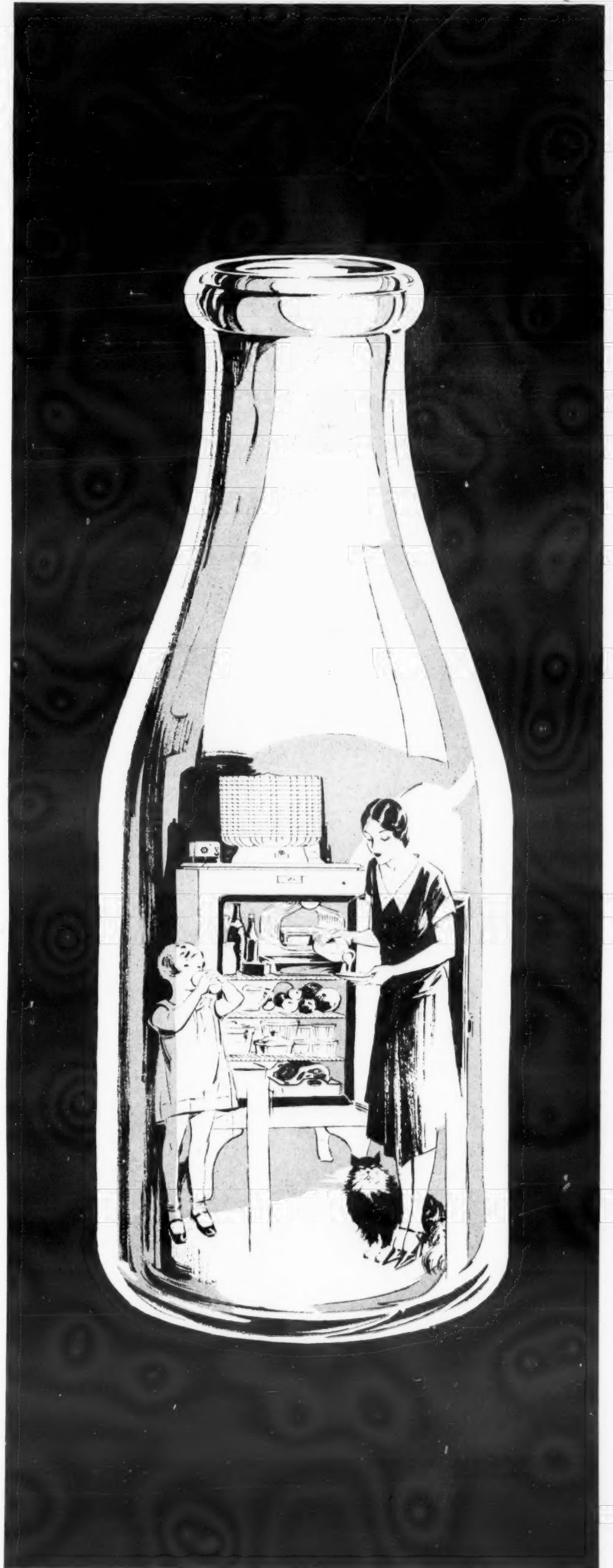
MILK BILLS

YOUR prospects have some idea of the luxury and convenience in owning a General Electric Refrigerator. But how many know that it *helps them pay their food bills*? Tell them. They'll be interested in hearing good news like this.

Every day that the General Electric Refrigerator keeps a bottle of milk or cream from souring, it is helping to pay a bill. Every day it keeps meat from spoiling, vegetables from wilting, it is helping to pay a bill. When it freezes ice cubes, makes frozen desserts, chilled salads and ice cream, it is helping to pay a bill.

Millions of newspaper and magazine advertisements are starting sales for you—millions of direct mail pieces—radio programs—billboards—merchandising helps—teaching your prospects that to own a General Electric Refrigerator is an *economy*.

Use this idea for all its worth. Arm yourself with the Sales Promotion Book, which your distributor will give you—and you'll find a *new* market opened to you.



GENERAL ELECTRIC ALL-STEEL REFRIGERATOR

ELECTRIC WATER COOLERS

COMMERCIAL REFRIGERATORS

ELECTRIC MILK COOLERS

now Leonard electric

moderately priced, covers 80%
of the electric household market



Leonard Electric, with Certified Refrigeration, and the 16-year-tested unit pronounced by thousands of present users as the quietest and most satisfactory in existence!

12 Visible Floor Demonstration Features:

- (1) CHILLOMETER freezing control
- (2) 25% EXTRA Leonard Approved Insulation. These two features combine to bring CERTIFIED REFRIGERATION—perfect food and flavor insurance
- (3) Defroster
- (4) Daylight Base
- (5) Satin Chrome Hardware
- (6) Vibrationless! Quiet!
- (7) Air-tight, double-sealed single door
- (8) Over-the-Counter Selling Features
- (9) Unmatched Beauty
- (10) Flexible Rubber Ice-cube Tray
- (11) Ample Ice Cube Capacity 42 cubes, 4 lb., in 8-cu. ft. model; 81 cubes, 8 1/4 lb., in 7-cu. ft. model
- (12) Moderate Price

backed by the strongest advertising in LEONARD'S 32-year advertising history

Combining the desired betterments in electric refrigeration—backed by experience and good-will of 50 years' standing—urged ahead by the greatest advertising in Leonard's 32 consecutive years of national advertising—Leonard Electric takes its place as the leader of a line of leaders!

Leonard Electric is loaded with sales features and designed to gross heavily. Built in 5- and 7-cu. ft. models, Leonard Electric meets the requirements of 80 per cent of the entire rich household electric refrigeration market, the market that totaled more than two hundred million dollars in sales last year alone! And the final guarantee of Leonard Electric's suc-

cess lies in the fact that this refrigerator is most moderately priced!

Moreover, once sold to your customer, the transaction is virtually completed, for this masterpiece of design is built to minimize servicing and make Leonard Electric true OVER-THE-COUNTER MERCHANTISE! Should you desire, you can replace the whole unit, high and low side at the same time, in a matter of minutes!

Mass market appeal—heavy advertising—price—over-the-counter features—what a combination! Get set for Leonard Electric Profits! Get all the details NOW!

LEONARD REFRIGERATOR COMPANY, 14260 Plymouth Road, Detroit, Michigan.

LEONARD

Electric

REFRIGERATOR

The Leonard Electric stands at the head of Leonard's Complete Household Refrigerator Line—18 fast-moving ice and electric numbers, suiting every purse and satisfying EVERY SINGLE CUSTOMER'S HOME REFRIGERATION DESIRES!

REX COLE TO ASSIST IN NEW YORK EDISON DRIVE

(Concluded from Page 1, Column 3)

tric Light Association; A. C. Mayer, merchandising director Electric Refrigeration Department, General Electric Company; T. K. Quinn, manager, and P. B. Zimmerman, general sales manager, also of the Electric Refrigerator Department of the General Electric Company, each contributed to the program.

The grand ballroom, with tables attractively set, and appropriately decorated with banners inscribed with the winter slogan, and R. Cooper and Rex Cole pennants formed the background of the meeting from seven until ten-thirty o'clock. The Rex Cole Mountaineers, who entertained diners during an excellent repast, were heard over the air by many listeners. In a picture, taken immediately before dinner, the new General Electric flashlight was used, doing away with the disconcerting noise and flare that is usually associated with flashlight pictures. A skit, in which talent and pulchritude of Rex Cole performers rivalled that of a Broadway act, showed graphically how the sales promotion department co-operates to put punch into winter selling.

Dancing in the east ballroom, to music provided by the Smith-Ballew orchestra, formed a climax to the evening.

In addition to those already mentioned, the following sat at the speakers' table: George F. McClelland, vice-president National Broadcasting Company; Richard Cooper, Chicago distributor, General Electric refrigerators; Raymond Hood, Clarence Law, vice-president and commercial manager, New York Edison Company; F. W. Crone, advertising manager, New York Edison Company; W. A. Root, president Bronx Gas and Electric Company; Charles L. Harold, general sales agent, Brooklyn Edison Company; C. A. Barton, general sales manager, New York and Queens Electric Light and Power Company; L. A. Coleman, vice-president, New York and Queens Electric Light and Power Company; F. W. Smith, vice-president United Electric Light and Power Company; J. F. Becker, sales manager, United Electric Light and Power Company; Dr. G. W. Allison, National Electric Light Association; James H. McGraw, Jr., McGraw-Hill Publishing Company; Robert Stevenson, general manager Rex Cole, Inc., and E. H. Campbell, manager sales promotion department, Rex Cole, Inc.

Members of the sales organization of Rex Cole, Inc., turned out in a body in the afternoon at 2 o'clock for a curtain-raiser, in which ideas for winter selling were presented dramatically. E. H. Campbell, of the Rex Cole organization, presided.

Exceptions to the theatrical feeling of the afternoon meeting were Arthur E. Schannel, who discussed the President's Plan, and Dr. G. W. Allison, refrigeration manager, National Electric Light Association, whose subject was "One Million in 1931." First act of the dramatic offering was "No and Yes," in which L. R. Hills and P. H. Hichborn debated to the end that all salesmen rushed out for galoshes and made plans for a big winter season. "A \$20,000,000 Show," "Over a Bottle," "Eye to Eye," and a drama of home life in Flatbush, preceded the two addresses, and a grand finale, entitled "Putting the Punch in Winter Selling," constituted the program. Grace R. Henry and Jack Mason directed.

REFRIGERATION THEME OF \$5,000,000 CAMPAIGN

(Concluded from Page 1, Column 5)

Gas & Electric Co., Wichita, Kan.; Southwestern Division—J. F. Owens, Oklahoma Gas & Electric Co., Oklahoma City, Okla.; Northwestern Division—G. M. Gadsby, Utah Power & Light Co., Salt Lake City, Utah; Rocky Mountain Division—Arthur Prager, Albuquerque Gas & Elec. Co., Albuquerque, N. M.; Pacific Coast Division—A. Emory Wishon, Great Western Power Co., San Francisco, Cal.; Southeastern Division—J. G. Holtzclau, Virginia Electric Power Co., Richmond, Va.; North Central Division—W. H. Burke, Minnesota Power & Light Co., Duluth, Minn.

MAJESTIC DISTRIBUTORS READY FOR FLYING START

(Concluded from Page 1, Column 1)

with metal strips. This latter job, unusually handsome, has not been placed on the market because of production difficulties.

Before getting down to business the distributors were hauled to the Grigsby-Grunow plants in four big buses, marshalled by "Jimmy" Davin, sales promotion manager. The visitors saw the new refrigerators go down the line, and wit-

nessed the fabrication of the "midget model" Majestic radio.

Between factory inspection trips lunch was served at the Midwest Athletic Club. Here Bill Grunow announced sales policies for the remainder of the year, and recounted some of the experiences encountered in getting the refrigerator ready for the market. Sales Manager Herbert E. Young led a short business discussion.

Late in the afternoon the party returned to the Lake Shore Athletic Club and spent some three hours inspecting the exhibits and radios, refrigerators and advertising layouts. Engineers were on hand to compare and contrast for the distributors the various features of the refrigerators represented.

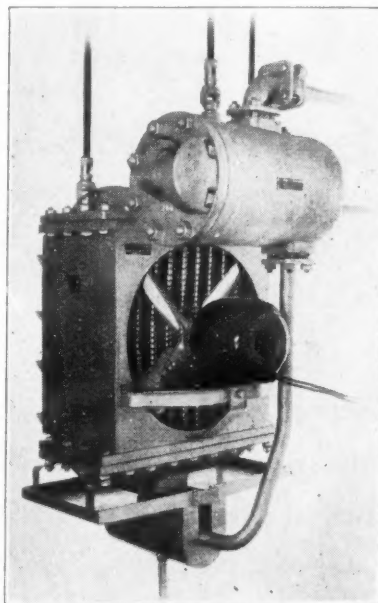
A banquet, truly large, completed the day's program. Before and after the meal the distributors listened to talks from Messrs. Grigsby, Grunow, Young, Davin, Kranz, et al.

AUTOMATIC DEFROSTING IN GRINNELL COOLING UNIT

Providence, R. I.—New refrigerating apparatus for general applications, equipped with an automatic defrosting process and automatic control of temperature conditions, has been put on the market by the Grinnell Company. It is known as the unit cooler and liquid level control.

The design of the unit cooler, according to C. H. Breidenthal, engineer in charge of the development, generally follows the principle of modern water tube construction. The tubes are placed vertically, in order to eliminate any return bends or pockets that would favor gas locking conditions. Radiating fins and air circulation are features of the cooler that increase the heat transfer per square foot of surface.

The automatic defrosting and automatic control of temperature conditions, are made possible through the use of the Grinnell liquid level control, also a new development. This control is designed to maintain a predetermined



Compact Grinnell Installation

level of liquid refrigerant not only in unit coolers, but also in pipe coils, direct expansion milk coolers, direct expansion ice cream freezers, brine coolers and similar equipment.

The tubes of the unit cooler are cold-drawn seamless steel, with the entire surface hot-dipped in order to make it corrosion-proof. The tube sheets are flanged steel, the tubes being expanded into the tube sheets by means of a specially developed rolled joint. The flanged heads of close grain valve iron are attached to the tube sheets by means of a tongue and groove combination. All gaskets are lead. The housing is constructed of lead-coated iron. Motor supports and brackets are dropped forged steel. The fan is constructed with aluminum blades. The motor, of 1/25 h. p., consuming 98 watts, is of the enclosed, moisture-proof type. All bolts, nuts, screws, brackets, tube sheets, etc., are Parkerized to prevent corrosion. After assembly the entire unit receives two coats of aluminum color Duco lacquer.

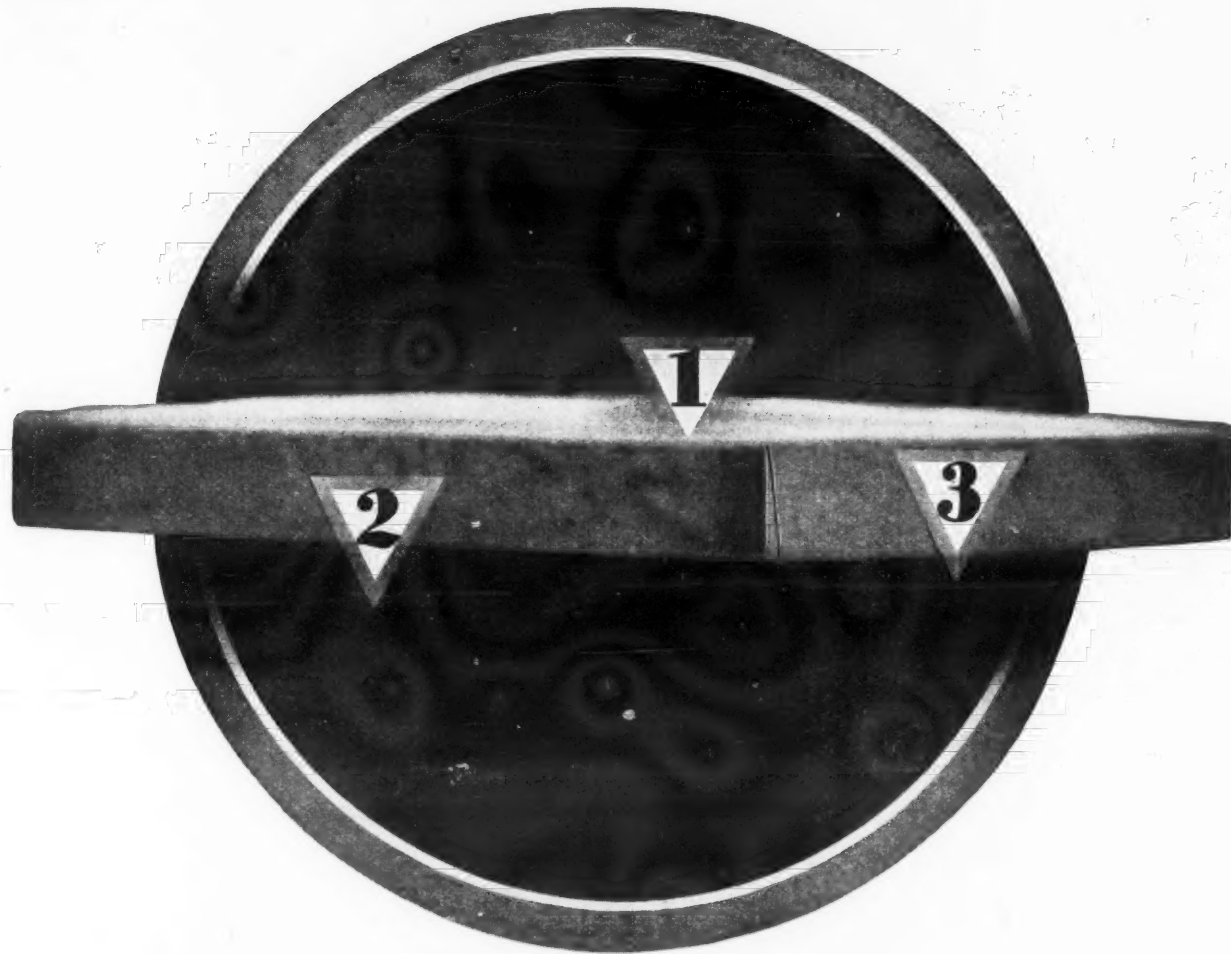
The unit cooler has a front face of 18 by 18 in. with a 9 in. depth. Overall dimensions, including drip pans, are 23 in. deep, by 23 1/2 in. wide, by 42 in. high.

The first installation of the Grinnell unit cooler is now in operation in the milk storage room of a New England dairy. Two units coolers and one liquid level control were installed to replace the pipe coil system formerly employed.

MOTOR CAR DISTRIBUTOR ADDS KELVINATORS

Houston, Tex.—A franchise for the sale of Kelvinator electric refrigeration has been secured by the Shelor Motor Company of Houston, Texas. William Anderson has been appointed sales manager of this new division.

Finer... more efficient than ever before



Dry-Zero, the most efficient commercial insulant known to science, announces a new Pliable Slab with the record low conductivity of .221, the lowest ever reached in the insulation field.

Besides this remarkable advance in efficiency, the new Dry-Zero Pliable Slab offers further advantages:

- 1 • • • Because of its natural resiliency, it "*cushions out*" on the inner side, pressing close to and filling any irregularities in the porcelain liner.
- 2 • • • A rigid backing makes it firmer and stiffer, except on the "cushion" side, allowing much easier handling in production.
- 3 • • • The entire slab is wrapped and sealed in duplex waterproof kraft paper. A layer of odorless asphalt is rolled onto the inner surface of the duplex paper under heat and pressure.

It is light in weight. A square foot of three inch finished Pliable Slab weighs only eight ounces. Distributors and Dealers all over the country are cutting transportation costs with Dry-Zero insulated refrigerators. Yet, in spite of its unique efficiency and added advantages, the new Dry-Zero Pliable Slab is low in price.

DRY-ZERO CORPORATION, 130 NORTH WELLS STREET, CHICAGO, ILLINOIS

DRY-ZERO

THE MOST EFFICIENT COMMERCIAL INSULANT KNOWN

Rex

Cabinets—built as good cabinets should be built. They are sound in design, sturdy in construction, and present real beauty in appearance. Evident values make REX Cabinets an asset to any unit manufacturer. REX will be glad to serve you.

Just write!

Rex

Rex Manufacturing Co., Inc.
Connersville, Indiana

Campaigning in Mexico



Mexico City, Mexico—A highly successful electric refrigerator sales campaign has been completed by the Electric Bond & Share Properties in Mexico. The campaign was intensive and lasted for 30 days. It was the first utility refrigeration campaign to be conducted in this republic, and the results are well worthy of the designation "spectacular" when it is taken into consideration that the company's sales staff in Mexico had practically no previous merchandising experience. The northern and southern divisions of the company finished the refrigeration campaign well over their quota.

Previous to the initiation of the campaign, a sales school was conducted in Mexico City. The classes were attended by the entire sales staff. A feature of this instruction was the exhibition by the Mexican branch of the General Electric Company of motion pictures depicting the construction and methods of merchandising the General Electric machine. Sales talks were

given in Spanish and typical floor and home sales demonstrations were made by the sales staff. The outstanding success of the refrigerator sales drive was largely due to the thorough preparations made by Mr. Herring, commercial manager of the northern division of the company, and Mr. Poyntz, commercial manager of the southern division.

The campaign was opened by a veritable "barrage" of a series of direct mail, entirely in Spanish, to selected prospect lists. Special daily newspaper advertising was also employed, tying in with window displays and truck publicity. A further incentive to put the drive "over the top" was given by the Electric Bond & Share Company and the Mexican General Electric Company, with the offer of handsome prizes to those who made the best showing.

The drive brought out some real getters. First prize for the northern division was captured by E. J. Jordan of Celaya; second prize by Carlos Gonzalez of Tampico, and Carlos Frias of Torreon, and E. L. Quezada of Saltillo, were tied for third place.

The southern division vied with the northern for the honors of the drive. It went over the top with flying colors. The prize winners are: G. Galeazzi, of Puebla City, first prize; J. Mora, of Vera Cruz City, second prize, and Juan de Dios Hernandez, of Vera Cruz City, third prize.

A remarkable feature of the sales campaign was the work of Mr. Jordan. Working in the very small town of Celaya, State of Guanajuato, he sold 16 machines during the 30 days of the campaign. Celaya has only a few thousand inhabitants.

The results of this first intensive work in Mexico are being followed with great interest by refrigeration executives. Mexico as a refrigeration market always has looked tempting.

REFRIGERATORS ON VIEW AT PHILADELPHIA SHOW

Philadelphia, Pa.—Eight makes of electric refrigerators were displayed by local dealers and distributors at the Electric and Radio Show which closed on October 4, after breaking all former records. The attendance for the week was well over 115,000, with Thursday, Friday and Saturday the banner days. The show, an annual affair, was sponsored by the Electrical Association of Philadelphia and the Radio Distributors' Board of Trade.

Many refrigerator dealers and distributors in the Philadelphia district made use of the show to demonstrate to the buying public the latest in mechanical refrigeration. Refrigerators displayed included Kelvinator, Frigidaire, General Electric, Welsbach, Zerzone, Westinghouse, Norge and Lipman commercial units.

D. C. Birdsell, president of the Decorative Lamp Shade Company, was chairman of the show committee, and George R. Conover was managing director.

Reports from various exhibitors indicated that a greater volume of business was lined up for the current season than at any similar show.

NEW YORK HOTEL GETS COPELANDS

New York, N. Y.—The Barbizon-Plaza, new 39-story hotel in this city, is completely equipped with Copeland refrigerators from cellar to roof.

Included among the Copeland units which are installed are a 28-ft. section storage refrigerator with two meat compartments, two vegetable compartments, and one freezer compartment; an ice-maker; an ice cream freezer and brine cooler; 25 water coolers, and 20 pantry refrigerators. Also installed are: a short order refrigerator, a pastry refrigerator, and a cook's refrigerator.

Another well known building in New York City which is furnished with Copeland equipment is the International Telephone Building.

AUTOMOTIVE OFFICIAL WITH LEONARD

Grand Rapids, Mich.—F. D. Brebner, formerly an executive of the Chrysler Corporation, has been made factory manager in charge of cabinet production of the Leonard Refrigerator Company.

Mr. Brebner, who already has taken up his residence in Grand Rapids, has been manager of the Chrysler plant at Newcastle, Ind., formerly the Maxwell plant. Previous to that he had been with the Maxwell Motor Company in Detroit.

Easy to handle.... Highly efficient

INSULATION



BALSAM-WOOL SEALED SLABS

made especially for Mechanical Refrigerators

As a service to Mechanical Refrigerator manufacturers, these practical Sealed Slabs are made to any length, breadth, or thickness.

Rigid enough for easy handling, flexible enough to fit snug—they eliminate patchwork, reduce labor costs, increase the efficiency of your refrigerators.

They are ready to put quickly in place. And once in place, they are there to stay. Sanitary, odorless, vermin-proof, economical—carefully sealed against moisture.

The average thermal conductivity of

Balsam-Wool Sealed Slabs does not exceed .25 B. t. u. per square foot, per inch thickness, per one degree Fahrenheit difference in temperature per hour.

They are built up to required thickness with layers of Balsam-Wool Blanket—positive assurance that each is completely filled with a permanent, non-settling, highly efficient sheet of insulation.

If you haven't already examined the perfected Balsam-Wool Sealed Slab—let us send you one free. Write to our nearest sales office—today.



WOOD CONVERSION COMPANY

Mills at Cloquet, Minnesota

Industrial Sales Offices:

Chicago, 360 No. Michigan Ave.

New York, 3107 Chanin Bldg.

Detroit, 3084 West Grand Blvd.

Manufacturers of Balsam-Wool Insulations for Domestic Refrigerators, Motor Buses, Airplanes; Balsam-Wool Steel Passenger Car Insulation; Balsam-Wool Refrigerator Car Insulation; Balsam-Wool Standard Building Insulation and Nu-Wood Insulating Board; Balsam-Wool Acoustical Blanket

Room Coolers Increase Sales

Cincinnati, Ohio—The branch of the Frigidaire Sales Corporation, 811 Race St., a short time ago installed five room coolers for Granada Gardens, Inc., one of Cincinnati's leading restaurants.

After the installation of the room coolers, there was a decided contrast in the temperature of the room and that outside. The temperature of the restaurant was lowered 10 degrees and the humidity of the rooms was considerably

reduced. The business of the restaurant increased and the customers ate more food and different kinds of food.

Mr. Commasair, owner of Granada Gardens, said that the room coolers were worth \$1,000 in advertising, and increased his trade at least that sum. Refrigeration for the kitchen, ice cream cabinet, drinking water and sandwich blocks are also by Frigidaire. The picture shows the front of the restaurant.



Refrigerators

Tested • Both Ice and Mechanical

Refrigerators Tested for Performance in our Refrigerator Laboratory. This service is unique for the Manufacturer or Distributor.

We invite your inquiries.

George B. Bright Co.

Refrigerating Engineers and Architects
2615 12th Street, Detroit

The Imitation Food Products Co.

(Branch of The Artistic Production Co.)

107 Lawrence Street

Brooklyn, N. Y.

Ask for our catalog of January 1, 1930. Direct sales only. "Indispensable with refrigerator display."

31% AHEAD of 1929

—AND 1929 HAD BEEN THE BIGGEST YEAR IN KELVINATOR DOMESTIC REFRIGERATION HISTORY

Kelvinator distributors, dealers and salesmen have added still another record to their long list of selling achievements.

1929 was a record-breaker, the biggest and most successful year in Kelvinator's sixteen years in the domestic refrigeration business. But the glory of the 1929 record is far outshone by the brilliance of the 1930 performance.

For the fiscal year just ended, Kelvinator domestic sales were 31 per cent greater than 1929—an achievement that reflects the salability, the inherent quality and value, of the product; a sales record that emphasizes the character and capabilities of Kelvinator merchants.

—and for 1931 Kelvinator says—"full speed ahead"!

Prospects for 1931 are splendid. Kelvinator merchants, to a man, are all set to establish new records, to make greater sales and greater profits.

Every one of the 18,000,000 prospects for electric refrigeration in this country are **KELVINATOR PROSPECTS**. The Kelvinator Domestic Line includes the correct model for every size home and every size purse. With the Kelvinator Franchise, every prospect is **YOUR PROSPECT**, and the volume and profits depend entirely upon the aggressiveness and ability of your organization.

In addition to the vast Domestic Market,

Kelvinator merchants have another source of practically unlimited profits, the famous line of Kelvinator Commercial Equipment for restaurants, banks, bakers, butchers, grocers, florists, factories—equipment for every commercial refrigeration need.

With Kelvinator, it's "full speed ahead" for 1931! Behind the great Kelvinator line is the biggest advertising campaign and the most comprehensive sales promotion program in Kelvinator's history. 1931 is full of promise and profits for Kelvinator Merchants. Write for full information about the Kelvinator Franchise—the most valuable franchise in the refrigeration industry today.



The New Yukon Model \$159.50

f. o. b. Factory

In less than 3 months, the new Kelvinator Yukon Model—the lowest priced Kelvinator ever offered—has swept the country from coast to coast. Dealers everywhere are reporting a constantly increasing interest in and a steadily increasing sale of this great new low-priced quality electric refrigerator. There is nothing in the industry to compare with the profit-possibilities of Kelvinator's Yukon Community Dealer Franchise. Write for complete details about this big money-maker and the many features of the dealer franchise. Use the coupon below.

C	O	U	P	O	N
Sales Department, Kelvinator Sales Corp., Detroit, Mich. Gentlemen—Please send me complete information about the Kelvinator Franchise and the Kelvinator Yukon Community Dealer Franchise.					
Name _____					
Street Address _____					
City _____ State _____ (152)					

Kelvinator

KELVINATOR SALES CORPORATION, DETROIT, MICHIGAN

Kelvinator of Canada, Ltd., London, Ontario

Kelvinator Limited, London, England

ELECTRIC REFRIGERATION NEWS

The Business Newspaper of the Refrigeration Industry

Published Every Two Weeks by

BUSINESS NEWS PUBLISHING CO.

550 Maccabees Building, Woodward Avenue and Putnam Street
Detroit, Michigan. Telephones: Columbia 4242-4243-4244

Subscription Rates:

United States and Possessions: \$2.00 per year; three years for \$5.00
All Other Countries: \$2.25 per year; two years for \$4.00

Advertising Rates on Request

F. M. COCKRELL, Publisher

WILLIAM JABINE, Editor

FREDERICK W. BRACK, Advertising Mgr.

JOHN DRITTLER, Managing Editor

GEORGE N. CONGDON, Business Manager

GEORGE F. TAUBENECK, Assistant Editor

Eastern Manager: H. A. DeLashmuth, 1950 Graybar Bldg., New York, N. Y.

Phone Lexington 9113

Chicago Representative: F. W. Henkel, 306 S. Wabash Ave., Phone Wabash 6668

Copyright 1930 by Business News Publishing Co.

Vol. 5, No. 4, Serial No. 106, Part 1

October 22, 1930

Why Keep on Guessing

THE case for the publication of industrial statistics has been argued so often that it seems unnecessary to repeat what has been said. It is sufficient to say that the progressive industries of the country keep their statistics in an open book, where they may be consulted by all who are interested. It might be a good idea, however, to point out a few specific and practical ways in which the publication of accurate facts and figures would be of benefit to the refrigeration industry.

Take the case of the supplier, the man who makes one of the host of products that go into the modern refrigerator. Steel for example. The steel manufacturer does not depend upon the refrigeration industry alone. He sells his product to the automobile industry, the construction industry and others too numerous to mention. He wants the refrigeration business and will make a real effort to get it, but when he makes that effort he is entitled to know approximately how much steel the refrigeration industry is going to use in any given year. Then he can plan intelligently, he can determine what grades to make, and how much of each grade to turn out. He needs reliable statistics in order to serve the industry properly.

What about the machinery used today in manufacturing refrigerators? How much of it is special stuff, built to special designs and so costing several times what it should? Builders of machinery are always willing to put new machines into regular production when they have a definite idea of how many are required and the volume is sufficient to justify the expense of tooling up. They have new business departments too, which are always on the lookout for new markets, which can be definitely measured.

Suppliers and machinery manufacturers are strong believers in research. They employ engineers and statisticians to study the various fields in which their products can be used. A good research man has an orderly, scientific type of mind. It is hard to interest him in an industry which believes in secrecy.

Of course the average refrigeration manufacturer knows his own production and can tell the research man just what he needs for his own plant. But the research man can't hope to build a profitable business for his company by supplying just one refrigeration plant. He must be able to figure on the industry as a whole, before advising his employers.

What about the sales end of the refrigeration industry? Do sales managers and sales promotion men go into territories without finding out first the population and then the number of wired homes? Are not these published statistics of immeasurable help in selling refrigerators?

Then why not help the men who are dealing with the refrigeration industry to plan their work with the same information at their command that refrigeration men demand in planning their own sales? Why not make a start at least by pooling production figures in the hands of some impartial and trustworthy person who can release the industry totals without at the same time revealing those details which are rightly deemed confidential?

At the present time the refrigeration industry's statistical fund of information is in sorry shape. The latest Government estimates are published in another column, and they in turn are based on "trade estimates." The wildest sort of estimates find their way into print.

Everybody is engaged in a big guessing contest, and while the guessing is going on, the industry is losing an opportunity to take its place among the moderns of the business world. It is a young industry, full of vigor and promise. As far back as 1909 Judge Gary warned business against secrecy of operations, a warning heeded by many industries to their profit. The present refrigeration industry wasn't born at that time. Perhaps that explains the situation.

Working With Facts

AN excellent example of what statistics are doing for the sales end of the refrigeration industry may be found on Pages 10 and 11 of this issue. George Belsey, who is the G. E. distributor in the Los Angeles territory, tells in detail what his organization has accomplished by the use of market studies. Mr. Belsey was formerly an official of Fuller & Smith, advertising agency of Cleveland, and has brought into the refrigeration industry a thirst for accurate knowledge of his market, that has resulted in the thorough surveys on which his yearly plans are based.

STATISTICS SHOW GROWTH OF INDUSTRY

Government Figures Reveal Refrigeration Progress

NOTHING shows the remarkable growth of the mechanical refrigeration industry more clearly than a perusal of the pages of the Commerce Yearbook for 1930, just issued by the United States Department of Commerce. In most of the tables of statistics, mechanical refrigeration turns up as a sort of stepchild, the records for only a year or two being given, because nobody thought it worth bothering about until three years ago. The 1927 biennial census of manufacturers finally recognized mechanical refrigeration as a separate industrial unit, and all figures for periods subsequent are duly segregated with that fact in view.

Unfortunately, even the United States Government has to rely on what it calls "trade estimates" for its picture of the industry in the new yearbook. Such estimates always are open to question and contain a liberal amount of pure guesswork. Refrigerators are omitted from the list of electric machinery, apparatus printed on page 412, but down at the bottom of the page, under the table which tells of everything electrical, from generators to fuses, appears the following summary. It is not in table form, as though to give additional emphasis to the fact that the figures quoted are lacking in authority. This paragraph reads:

"Electrical household refrigerators have been built for many years, but no considerable sales were made prior to 1923. At the end of 1924 there were 70,000 domestic machines in use. Trade estimates are that 80,000 were sold in 1925, 248,000 in 1926, 365,000 in 1927, 468,000 in 1928, 630,000 in 1929, and that 1,800,000 were in use at the end of 1929. Census data on production were available for the first time in 1927, during which year 391,000 units with cabinets were produced. In addition there were manufactured 68,000 units without cabinets. The total production of electric refrigerators in 1927 was valued at \$78,420,000."

Comparisons always are helpful in interpreting statistics, so at this point it might be a good idea to give the corresponding figures for one of two other electric appliances. In 1927, for example, refrigerators worth \$78,420,000 were produced as against washing machines worth \$59,254,000 and vacuum cleaners worth \$36,222,000. Also it is worthy of note that while the refrigeration sales and production curves keep steadily upward, the other items fluctuate. Vacuum cleaners, for example, did better in 1925 than in 1927.

Inasmuch as most of the figures in the new Commerce Yearbook are abstracted from the 1927 census of manufactures, the summaries published under the head "Mechanical Refrigerators" in the reports of that census doubtless will be of interest. They are printed below:

The chapter of the Commerce Yearbook on industrial machinery also contains valuable data on refrigeration, including a startling gain in exports. In this section all kinds of mechanical refrigerators and refrigeration units are lumped together, no attempt being made

to identify household units or other of the smaller types of equipment."

In a chart showing the value of the principal classes of industrial machinery manufactured, refrigerating and ice-making equipment holds a high position, with a total value of \$129,000,000 in 1927. This total was exceeded only by engines and pumps. Between 1925 and 1927 refrigerating machinery rose from fifth to third place in this tabulation, passing both machine tools and textile machinery.

The export figures, as said before, show a remarkable increase. These figures, because of the fact that exports are easily checked at the port of departure through clearance papers and other records, are carried through 1929. The refrigerating and ice-making equipment record reads as follows:

1923	1924	1925
\$2,265,000	\$2,180,000	\$2,485,000
1926	1927	1928
\$5,059,000	\$7,447,000	\$9,532,000
	1929	
	\$14,800,000	

The following explanation of the increase in exports, which was by no means confined to refrigeration, although refrigeration was among the leaders, is printed in the Yearbook:

"The recent expansion of exports of machinery has been owing to the strong demand for American equipment throughout practically the entire world. All of the leading regions of destination took increased quantities of machinery in 1929. Export to Europe, the largest single market, totaled \$85,100,000 in 1929, compared with \$68,481,000 in 1928, an increase of 24.3 per cent. Northern North America, the next largest market, took exports valued at \$70,763,000, which was an increase of 32.8 per cent from 1928. Exports to European markets were almost two and one-half times as large in 1929 as in 1924, while those to Northern North America were slightly over two and one-half times as large."

Of course, figures showing what happened three years ago, or even last year, are not as helpful to the industry as up-to-date statistics would be. Blanks were sent out in the last few months to all refrigeration manufacturers by the Census Bureau, and unless the refrigeration industry differs greatly from many others, it is not likely that more than a small proportion of those blanks have been returned properly filled out. Until they are returned to the Bureau it will be impossible to release the 1929 figures.

Estimates of 1930 production made at the beginning of the year placed the number of units at about 1,000,000. Various factors such as the prolongation of the business depression, make it look now as though that mark would not be reached this year, although there will be a substantial increase over last year. A majority of the companies in the field have made more refrigerators this year than last—and sold most of them, too—but the newcomers in the arena have not made the progress that was expected of them when the year began. The Majestic unit, for example, which was expected to be on the market in

large quantities several months ago, is just getting into production. Other new manufacturers, several of them from the radio field, have been slow in getting under way, although their plans have been talked about for a long time.

Preliminary census figures for the entire country show that the total population of the forty-eight states and the District of Columbia will be approximately 122,700,000. With 1,800,000 refrigerators in use at the end of 1929, and another 850,000 produced this year, the total will be 2,650,000, which will mean one mechanical refrigerator to every 46 persons in the country, or one to every nine families. All available statistics show that there is plenty of room for the industry to expand in the home market, and at the same time cultivate the export market which seems to be increasing so rapidly.

The 1929 figures on wired homes published early this year in *Electrical World*, placed the total at 19,721,486. The increase over 1928 was 887,516, and if that rate of increase is maintained this year, the total number by January, 1931, will be in excess of 20,600,000. That would mean one refrigerator to every 7.7 wired homes. If the increase in wired homes is materially greater than the increase of 1929 over 1928, it ought to make the ratio of refrigerators to wired homes 1 to 8.

New figures on wired homes are in preparation by the National Electric Light Association, and it is expected that they will be ready before the end of the year. The new tabulations will go further than those of the past and will show domestic electric meters throughout the United States. They probably will be segregated by counties.

G. E. COMPANY REPORTS THIRD QUARTER ORDERS

Schenectady, N. Y.—General Electric Company orders received during the third quarter of 1930 amounted to \$77,338,074, compared with \$116,688,014 for the corresponding quarter last year, President Gerard Swope has announced. Orders received during the first nine months of 1930 amounted to \$267,651,832, compared with \$337,404,470 during the corresponding period last year.

These figures group orders for all of the G. E. products, and it is impossible to tell what proportion are refrigerator orders. As stated in the August 27th issue of the News, the Refrigeration Department is the second largest in the G. E. structure, being surpassed only by the Motors Department. This indicates that a goodly proportion of the orders were for electric refrigerators.

Sales billed for the first nine months of 1930 amounted to \$287,886,541.05, compared with \$301,812,808.55 for the corresponding period last year.

Profit available for dividends on common stock for the first nine months of 1930 was \$42,518,708.56, compared with \$47,965,831.71 for the first nine months last year.

The profit available for common stock for the nine months is equivalent to \$1.47 per share in 1930, and \$1.66 per share in 1929, on the shares now outstanding.

As a result of the transfer of radio receiving set and tube business, orders received, sales billed and net income from sales in 1930 do not include radio sets and tubes.

N. E. M. A. COMMITTEE WORKING ON CODE

Detroit, Mich.—The Technical Committee of the Refrigeration Division, National Electrical Manufacturers' Association, was in conference at the Hotel Statler here, Tuesday, October 21, and discussed ways and means for promoting the safety code sponsored by the American Society of Refrigerating Engineers.

Glenn Muffy, chairman, C. C. Spreen and Harry Hayes were present at the meeting, while E. T. Williams and A. R. Stevenson, also members, were consulted by long distance telephone. The Committee has agreed as to the details of a standard code.

ROOKIE COMES THROUGH

New York, N. Y.—Although he is one of the newest in the apartment house division of Rex Cole, Inc., metropolitan distributors for General Electric refrigerators, Geo. H. Stifter has just sold eighty-six General Electrics to Simon Hess, Bronx apartment house owner and operator. The machines will be installed at 2472 Grant Ave., Bronx, and they will all be models G-40. The apartment house which has been occupied for some time will be completely equipped, regardless of leases governing the individual suites in the building.

MECHANICAL REFRIGERATORS

[A preliminary report for this industry was issued under date of January 23, 1929. The present report will be included in the final report of the Biennial Census of Manufactures, 1927]

Description of the industry.—This industry embraces establishments engaged primarily in the manufacture of mechanical refrigerators. (The term "mechanical refrigerators" is used to designate not only the motor-driven type, but also those which use heat to actuate the cooling medium; consequently the term covers all types which do not use ice as the refrigerating agent.) The manufacture of mechanical refrigerators was first treated as a separate industry at the census for 1927, and therefore no statistics for earlier years are available.

TABLE 1.—SUMMARY FOR THE UNITED STATES: 1927

[The value of mechanical refrigerators was included in that of "Refrigerating machinery (other than ice-making)" in the section for "Machinery," pages 1033 and 1038, in the report for 1925]

ITEM	Number or amount	ITEM	Number or amount
Number of establishments..	22	Products, total value ¹	\$96,513,649
Salaries officers and employees.....	2,086	Electric refrigerating units with cabinets—	
Wage earners (average for the year).....	11,285	Number.....	388,680
Salaries and wages, total...\$23,818,284		Value.....	\$67,278,879
		Electric refrigerating units without cabinets—	
Salaries.....	\$ 6,106,278	Number.....	66,639
Wages.....	\$17,712,006	Value.....	\$ 9,844,209
Cost of materials, supplies, fuel, and power, total...\$42,651,262		Other products, including gas refrigerators ² and units, value.....	\$19,390,561
Materials and supplies.....\$42,105,673		Value added by manufacture ³	\$53,862,387
Fuel and power.....\$ 545,589		Horsepower.....	40,084

¹In addition, mechanical refrigerators and parts were reported as secondary products by establishments engaged primarily in other lines of manufacture, as follows: Mechanical refrigerators (electric), complete with cabinets, valued at \$1,213,948; units without cabinets (electric), \$83,224; and electric-refrigerator parts, \$128,677.

²Not shown separately, to avoid disclosing the production of individual establishments.

³Value of products less cost of materials, supplies, fuel, and power.

ALERT SALES CREW KEEPS REFRIGERATION IN FRONT

By George F. Taubeneck

Chicago, Ill.—To the prospect who desires electric refrigeration but doesn't want a Frigidaire because it is made by General Motors and she once had a wreck in a Buick, or who thinks the General Electric has a funny-looking top, or who once visited a cousin whose Kelvinator didn't make ice cubes big enough to suit her, the Commonwealth Edison Co. of Chicago has the answer unanswerable. The prospect gets just what she wants.

Commonwealth Edison salesmen do not sell a competitive product. They sell electric refrigeration. The particular make selected is decided by national advertising and local advertising, plus whatever person-to-person contacts which may have produced an approach-response within the prospect toward a certain refrigeration trade-name.

Armed with order-blanks for Frigidaires, Kelvinators and General Electrics, these salesmen have bumpers fore and aft, and shatter-proof windshield glass, enabling them to cruise with confidence and abandon through the tricky traffic of trade-name sales resistance.

When Mr. Quota Buster is perorating upon the merits of the Hydrator and the Cold Control, Mrs. Thrifty Housewife may attempt to stall him off by hinting that she thinks the Monitor Top might save upkeep bills. Whereupon Mr. Buster can pounce upon that "bite" and quickly reel in his capture.

Ideal Set-Up

Having three leading makes for sale is an ideal set-up, believes William T. Reace, who heads the electric refrigeration sales organization of the Commonwealth Edison Co. Upon it Mr. Reace and his associates base their whole plan of attack.

Sales of electric refrigerators run second only to radios in the huge merchandising operations of this Insull organization. For 1930 the quota set for Mr. Reace and his men is \$1,500,000, and thus far they are hitting on all eight cylinders.

Some 65 domestic (retail) salesmen are kept on the job all the time. Ten men sell commercial and water-cooling jobs, while six sell at wholesale (12 or more refrigerators to a customer).

Wholesale activities are confined entirely to Kelvinators. The Commonwealth Edison Co. is a Kelvinator distributor.

Retail salesmen usually lean to one of the three makes, keeping the other two in reserve. Should a salesman whose best sales talk hinges around the Kelvinator find himself helping a prospect crystallize half-formed desires for a G. E. or Frigidaire, he takes the prospect to the main office shop at 72 West Adams Street and enlists the help of the expert sales-closers whom the G. E. and Frigidaire distributors maintain on the floor.

Distributors' Representatives

A representative of each of these distributors, working under the rules of the Commonwealth Edison Co. while on the distributor's payroll, is stationed permanently at the main office shop, and handles new prospects who come into the display room, in addition to his sales-closing work. These men are salesmen of many years' experience, and have unusual records.

Other salesmen are kept on the floor of the main office shop, coming in from the field in rotation to spend a day on the sales floor before going back to field selling.

Nine branch stores are maintained at points scattered throughout the city, and from these home bases and the main office the salesmen work out into their respective territories.

The biggest problem of most sales organizations doesn't bother the Commonwealth Edison Co. much. Turnover of salesmen is as annoying to most mer-

chandisers as mosquitoes to vacation campers.

But the turnover of Commonwealth Edison refrigeration salesmen is rarely more than two or three (three men hired during the period to keep one man working steadily in six months.)

That record, according to Ernest A. Edkins, merchandising manager, is truly remarkable. The turnover of salesmen in other appliance fields, such as vacuum cleaners and washing machines, runs as high as five and six. And the mighty Chicago utility as a whole keeps its salesmen much better than do most sales organizations.

Inducements to Stick

Three things help Commonwealth Edison maintain a comparatively intact refrigeration sales force: (1) the regular perquisites which go to all of the Insull employees; (2) large, roomy territories for each salesman—big enough so that any man can, by reasonable application, earn a comfortable living therefrom; (3) three leading makes to sell.

Among the company inducements which help to keep men working steadily and tide salesmen over lean periods are pensions, insurance, savings funds and other employee privileges.

Upon retiring at the prescribed age and length of service, every employee of this Chicago utility receives an annual pension of one and one-half per cent of his peak earnings times the number of years he has worked for the company.

Annually at Christmas the company distributes free insurance to its employees, and additional insurance may be purchased at attractive rates out of salaries.

Employees may also turn three or five per cent of their salaries into a savings fund. These savings are eventually converted into Commonwealth Edison stock.

Quitters usually leave at the end of the first month, according to Mr. Reace. If the new salesman can keep his head above water for the initial 30 days, he usually sticks for a long time.

Most of the Commonwealth Edison salesmen are between 30 and 40 years old. All earn a good living; and many are first magnitude successes.

Sales Classes

Twice monthly a class of five or six new salesmen goes through a week-end school and joins the force. These men are chosen on appearance, general impression, and experience in selling specialties which cost more than one hundred dollars.

After the first interview the embryo salesmen talk with supervisors about territories. Following that they are turned over to instructors from the Frigidaire and General Electric distributors for a half day each, and to Kelvinator instructors from the utility.

Commonwealth Edison history and policy is expounded for half a day, after which the school is concluded by a short series of final polishing talks by the home staff.

During this period the men get no pay; and afterward they (except the wholesale men) work on a straight commission basis.

All employees of the company receive a regular discount on electric refrigerators, as they do on anything else sold by their employers.

Discounts are also given for quantity sales (up to 20 per cent), and to real

Commonwealth Edison's Trio



estate men and contractors, who get the customary 10 per cent, which is the due of all their tribe in Chicago.

Two recent special Kelvinator sales have stimulated business at the main office shop until the display floor resembled post-Easter bargain day at a women's hat counter.

The first sale was of 1930 Kelvinator units in 1929 boxes; the second big job of bargains came when company officials persuaded the Kelvinator Corp. to put a number of household units in boxes meant for apartment house multiple jobs.

Exceptionally low prices on these Kelvinators brought an unremitting stream

of prospects rolling into the shop. Often they found other jobs, at regular prices, suited their needs better. Hence the sale of special Kelvinators increased sales in all other lines.

Kelvinators are installed and serviced free for one year by the Commonwealth Edison Co. Installation and servicing of Frigidaire and General Electric machines are done by the distributors.

"Doorbell ringing," says Mr. Edkins, "has gone out of style. The coming trend of public utilities is toward home service. We are not so much interested in selling as we are in equipping the home completely and eliminating drudgery from the business of being a housewife."

SOUTHERN CONVENTION TO ATTRACT MANY ENGINEERS

Memphis, Tenn.—More than two thousand delegates are expected to attend the twenty-first annual convention of the National Association of Practical Refrigerating Engineers here, November 11-14. The convention gets under way on November 11, but on account of the Armistice Day celebration, no business sessions have been arranged.

All meetings will be held in the Municipal Auditorium, which will also house the exhibition consisting of 58 displays of machinery and equipment. Convention headquarters will be established at the Hotel Peabody. Discussions of power contracts, lubrication, practical methods of varying the capacities of ice manufacturing plants to meet load conditions in an economical manner, rebuilding ice manufacturing plants to obtain lower operating costs, air conditioning, Diesel engines for refrigerating and ice plants, sulphur dioxide, foodstuffs, industrial management and use of welding will occupy the larger part of the program. The Memphis Chapter plans to entertain the visiting engineers in true Southern style.

SALES MANUAL TELLS STORY OF SPARKLETS

New York City.—To enable its selling forces to tell the story of Sparklets, the miniature home soda fountain, in a more logical and emphatic manner, Sparklets, Inc., has prepared a comprehensive sales manual. The story has been divided into three sections: Number One, "Its Uses"; Number Two, "What It Is"; Number Three, "Instructions."

Each section is separately bound in a neat blue cover so arranged that pages may be inserted from time to time.

TINNED COPPER

Offers marked advantages

For ice-trays, grids, containers, linings for compartments of large commercial units and cans for storing ice cream, Tinned Copper offers the following advantages:

1. It is sanitary, easy to keep clean.
2. It does not impart taste to food of any kind.
3. It stands up under everyday service.
4. It is highly resistant to alkaline water.
5. Its high heat conductivity speeds up freezing.
6. It is easy to fabricate and reasonable in cost.

The American Brass Company is prepared to supply copper sheets polished, tinned or nickel plated. Chromium plated sheets can also be furnished.

Other Anaconda products for the electric refrigeration industry include Everdur, a high strength, corrosion-resisting alloy for valves

and fittings in contact with acid refrigerants; Brass, Tobin Bronze and Everdur die pressed parts (and forgings); Ambrac, a non-corrosive white metal for screws, bolts, racks, and metal trim.

Detailed information gladly sent on request. The American Brass Company, General Offices: Waterbury, Conn.

ANACONDA COPPER

Absopure

ELECTRIC FRIGERATOR

12 HOUSEHOLD MODELS

All porcelain and porcelain-lined. From 4.3 to 32 cu. feet capacity.

COMPLETE COMMERCIAL LINE

For Meat Markets, Grocers, Florists, Apartment House Multiple

THE Absopure franchise is an asset whose value will increase as refrigeration comes into its own. Some territory is still open. For details—write or wire the factory.

Absopure

Refrigeration Corporation

1560 Theodore Street

DETROIT - MICHIGAN

REFRIGERATION RUBBER WARE

Manufacturers of molded insulation for commercial and domestic refrigerator cabinets. Materials and parts developed to meet the exacting requirements of refrigeration efficiency.

THE AETNA RUBBER CO.
ASHTABULA, OHIO



The White Collar Men

who sell your electric refrigerator can sell the SUPER Oil Heator, too. The same skilled mechanics can install them both. Write for our Authorized Distributor Plan.

THE SUPER OIL HEATOR CO.
PAWTUCKET, RHODE ISLAND

New Binders Now Ready

for keeping your copies of
Electric Refrigeration News

In providing new binders for readers who like to keep back issues of the news in accessible form several improvements have been made.

The new binder is of larger capacity than the old because of the increased thickness of the paper. Twenty-seven metal retaining strips are furnished, since 27 issues will be published in 1930. The metal strip is inserted easily and quickly at the middle of each issue and does not "pinch" the paper at the binding edge. Every page lies flat and all type matter is easily readable.

On the new binder the name "Electric Refrigeration News" is neatly stamped in gold on the back binding edge as well as on the top cover. The binder has stiff covers of good quality black imitation leather.

You'll find the binders mighty good-looking and very convenient. A flip of the finger brings a back issue before you when you want to look up an article—an illustration—some information. Buy a binder!

Shipped postpaid upon receipt of \$3.75.

Electric Refrigeration News
550 Maccabee Bldg., Detroit

"It was built by BOHN"



The handy base cabinet may either be used for refrigerating machinery or the storage of cooking utensils, canned goods, vegetables, etc.

The name BOHN is our warranty that the finest materials obtainable have been utilized by skilled craftsman and refrigeration engineers to build for you this beautiful and scientific product—an all-porcelain BOHN refrigerator.

BOHN installations include many of the leading hotels, restaurants and hospitals in America.

BOHN refrigerators are used exclusively on all Pullman-built railway dining and buffet cars.

The United States War Department has purchased hundreds of all-porcelain BOHN refrigerators for our army barracks and battleships.

In choosing BOHN refrigerators, discriminating home owners throughout the country have given BOHN a representative list of which any manufacturer might be proud.

Write for details of the remarkably low prices that are now prevailing.

BOHN REFRIGERATOR COMPANY
SAINT PAUL, MINNESOTA

Accurate Knowledge of Market Key to Intelligent Selling

Surveys of Field Yield Valuable Data

By George Belsey
Southern California Distributor, General Electric Refrigerator

THE electric refrigerator industry has a fairly accurate idea of the proportion of American homes that are now using its product, but few distributors or dealers have a very accurate opinion of the number in use in their own communities, especially in the larger towns and cities.

Each day, new salesmen start out to sell electric refrigerators, with high hope of the public's interest and confidence in refrigeration and the particular brand they are going to sell, yet few sales managers can give these new recruits a definite picture of the local point of view regarding themselves and their competition. Refrigerator sales organizations spend much time discovering and studying sales arguments, but very little time discovering or studying their market and the market's point of view.

Why not find out what your market thinks of you and your competitors; of the entire subject and use of refrigeration; what they are using; or are thinking of using soon? Such information can be secured easily, inexpensively and accurately. It helps management and salesmen. It controls misguided enthusiasm, gives better direction to new plans, and adds confidence to the daily effort.

The Prospect's Viewpoint

We have applied market study to our business and feel certain that we have harvested a better crop of sales because we knew something about our prospects' point of view. And we were equally sure that if we knew the likes and dislikes of our potential customers, we could cultivate them so much more intelligently that a greater number of them would become buyers than if we merely trusted our own intuition.

As a matter of fact, the first move we made upon establishing our business in June, 1927, was to make a market study, or survey. In one respect that first survey was encouraging—mighty few people owned an electric refrigerator at that time. Nor did any make appear to be very strongly entrenched. To be sure, the better known makes were looked upon by many people as being highly desirable. But few people were dreaming of the possibility of owning one.

As for the product we were selling, the General Electric refrigerator, this first survey showed us what we already knew—that no one owned a General

statements. And, so far as our investigators were concerned, they were young men of the highest caliber, who were graduated this year from the University of California and who were amply paid for their work. Despite this, we carefully trained them to get unbiased information, and we maintain a close daily supervision over their work.

In making a survey, it is important that the group of people questioned be properly selected to represent the market. The market for electric refrigerators has not yet reached down into neighborhoods where the people live in ill-kept, unpainted homes; who are poorly educated, and thus cannot comprehend the economic and health advantages of electric refrigeration; who are indifferent to cleanliness and thus are not impressed with the sanitary features of an electric refrigerator.

Therefore, we confined our questioning solely to neighborhoods of the type our salesmen now work—we questioned people not necessarily distinguished by their incomes, but, rather, by their methods of living. In these neighborhoods our survey showed a saturation point of 30 per cent, whereas the actual saturation in Greater Los Angeles is probably less than half that percentage.

There is another pitfall to be avoided in making a market survey. If you want to find out what people think of you, you do not ask those closest to you. As the advertisements say, "Even your best friends won't tell you." If you are interested in knowing the true conditions which confront you, you ask those whom you have reason to believe are not going to flatter you or distort the picture. So, in making a market survey you do not work in a territory where competitive conditions are easy or non-existent. You work in that territory where competition is strongest, for it is in such territories that you will win or lose. There are isolated communities in Southern California where it would be difficult to sell anything but a General Electric refrigerator. There is, in fact, one town of nineteen families who own thirteen General Electric refrigerators, and no other makes are represented. But in making our 1930 survey we confined ourselves entirely to Greater Los Angeles, where every make of any consequence is represented; where newspaper and magazine circulation reaches its

interests of our competitors. Hence, in the tabulations here presented, we have indicated the makes of refrigerators not by name but by number. But here are some of the valuable facts which our survey revealed to us and which a similar survey made by you would reveal to you:

First, we found that 30 per cent of the homes (Table 1) which we class as prospects, now own some make of electric refrigerator. And we found that the nine districts of Greater Los Angeles, which we covered, varied in this saturation point from 17 per cent to 50 per cent. The districts in which we had not done a good job were graphically shown to us.

This question also revealed to us the real popularity of the various makes of electric refrigerators (Table 2) and showed that of all the refrigerators in use today, two-thirds of them have been sold by the two leading manufacturers, and that all of the other refrigerators divided the remaining one-third of the business among themselves.

Question 1-A asked when the electric refrigerator was purchased. To us, the result of this question was especially significant. It is to be remembered that the General Electric was not placed on the market in Southern California until June, 1927, consequently, we were not particularly interested in the years which preceded our entry in the field, nor, as a matter of fact, were they especially important, because in the year of 1928 practically as many refrigerators were sold in Southern California as in all previous years in the history of electric refrigeration. Table No. 3 gives the result of this question and revealed to us the progress we were making in establishing ourselves in this territory.

Non-Owners Interviewed

However, we are much more interested in what those who do not own electric refrigerators think of us, for they, of course, represent our future market. We asked them what refrigerators they were familiar with by name. Twenty-four different makes of electric refrigerators were mentioned (Table 4), but only three were known by name by any considerable number of people, although 99 per cent of the people, or practically everyone, knew at least one make by name.

We know how difficult it is for salesmen to interest a prospect in a product of which the prospect has never heard, and this showed us how successful our efforts to make everyone familiar with General Electric refrigerators have been.

Question 4 is especially significant, because it shows which way the tide of popular favor is flowing. Table No. 5 gives the results of this question and shows the effect of widespread and consistent advertising.

Question 5 (Table 6) was also very important, because the answers would

Table 1
Question No. 1 (WHAT TYPE OF REFRIGERATION DO YOU USE?)

	Total No. Interviews		Ice		Calif. Cooler		Electric Refrigerator	
	No.	%	No.	%	No.	%	No.	%
Greater Los Angeles	1,523		1,037	68.1	20	1.3	8	.5
							458	30.1

Electric, and that few had even heard of it. The General Electric refrigerator was just being introduced. We were starting from scratch. Each year since we have made another survey, compared our progress with competition, and gloried in the progress of public interest. Early in July, 1930, we completed our fourth market survey.

Regardless of how carefully a market survey is conducted, it cannot cost a great deal of money, and already we are sure that the money we spent has been returned to us many times, not only in the confidence we now feel that we are on the right track in our sales work, but also because it has revealed to us the weak spots in our program which we can correct in next year's work.

Anyone can make a market survey, but unless it is done carefully and intelligently it will not reveal the true facts and may, in consequence, be dangerously misleading. A skillful lawyer so words his questions that he secures from the witness the answers he desires. Such a procedure in a market survey would obviously make the survey worthless. The questions must be so worded that the answers give a true picture of what the person questioned actually thinks.

You will note in the questionnaire we used this year that although the questions called for a specific answer, the questions themselves made no specific

cult to sell anything but a General Electric refrigerator. There is, in fact, one town of nineteen families who own thirteen General Electric refrigerators, and no other makes are represented. But in making our 1930 survey we confined ourselves entirely to Greater Los Angeles, where every make of any consequence is represented; where newspaper and magazine circulation reaches its

Table 2

Question No. 1a (WHAT IS THE NAME OF YOUR ELECTRIC REFRIGERATOR?)

Of the 458 using electric refrigeration:

152 or 33.2% used No. 1
151 or 32.9% used No. 2
52 or 11.4% used No. 3
39 or 8.5% used No. 4
14 or 3.1% used No. 5
13 or 2.8% used No. 6
12 or 2.0% used No. 7
25 or 5.4% used all other makes combined.

greatest density; where people are constantly bombarded with countless appealing bids for a part of the family income. Here was the place to find out how effective have been our efforts to secure the favor and good-will of the people.

Naturally, our survey revealed much that we wish to keep confidential and much that we feel we should withhold because it might prove harmful to the

indicate to us the features of an electric refrigerator which were most influential in causing people to establish a preference. And we found that mechanical features were relatively unimportant; that the public was only mildly interested in side issues; that they were, first, greatly influenced by what their friends told them; and that, second, they consider the reputation of the manufacturer of vastly more importance than the accessories with which the refrigerator might or might not be equipped.

The results of the rest of the questions would only be interesting to that relatively small percentage of the readers of this publication who live in Southern California. And as a matter of fact, even to us they were not particularly important questions. The vital thing which we gained from the survey was the knowledge of the progress which we are making in our market; and the comparison of this fourth survey, with the three which preceded it, gave us this knowledge. The survey showed that we have grown from an unknown factor to the point where four out of five of the people in our territory knew us by name.

The prestige of our product had increased to the point where a substantial part of the people preferred the refrigerator we are selling to any other make, only effective salesmanship being needed

(Concluded on Opposite Page)

Table 3
Question No. 2 (WHEN DID YOU BUY YOUR ELECTRIC REFRIGERATOR?)

The 458 electric refrigerators were purchased in the following years:

	Indefinite		1926		1927		1928		1929		1st 6 mos. 1930		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No. 1	7	4.6	16	10.5	15	9.9	39	25.7	46	30.2	29	19.1	152	33.2
No. 2	5	3.3	2	1.3	7	4.6	28	18.5	54	35.8	55	36.4	151	32.9
No. 3	3	5.8	13	25.0	11	21.2	10	19.2	10	19.2	5	9.6	52	11.4
No. 4	1	2.6	2	5.1	13	33.3	12	30.8	8	20.5	3	7.7	39	8.5
No. 5	1	7.1	2	14.3	5	35.7	2	14.3	2	14.3	2	14.3	14	3.1
No. 6	1	7.7	..	..	1	7.7	1	7.7	5	38.4	5	38.4	13	2.8
Others	8	21.6	1	2.7	5	13.5	5	13.5	14	37.8	4	10.7	37	8.1
	26	5.7	36	7.9	57	12.4	97	21.3	139	30.3	103	22.5	458	

(Concluded from Opposite Page)

to rapidly create great numbers of them into buyers. We found that although 30 per cent of our immediate market had been sold, 70 per cent of it had been so effectively cultivated that it would soon yield to good salesmanship, and that there still remained another untouched market, of practically equal size, which needs only the persuasive touch of good educational advertising and salesmanship to yield almost limitless sales.

Frankly, this survey showed us to be

Table 4

Question No. 3 (WITH WHAT MAKES OF ELECTRIC REFRIGERATORS ARE YOU FAMILIAR?)

Of the 1,523 people interviewed, 1,065, or 69.9%, did not own electric refrigerators; 1,041 of these were familiar with the following electric refrigerators:

826 or 79.7% knew No. 1
809 or 78.0% knew No. 2
384 or 37.0% knew No. 3
45 or 4.3% knew No. 4
128 or 12.3% knew No. 5
84 or 8.1% knew No. 6
16 or 1.5% knew No. 7
45 or 4.3% knew all other makes combined.

Table 6

Question No. 5 (WHY DO YOU PREFER THIS MAKE?)

The 476 people without electric refrigeration who stated a preference gave the following reasons for their preference:

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Others	Total	
Recommendation of friends	35	129	7	3	..	2	2	178	29.5%
Reputation	33	138	2	..	..	..	..	173	28.6%
Mechanical features	3	54	1	..	..	2	1	60	9.9%
Previous experience	27	15	2	..	..	..	2	48	7.9%
Appearance	11	34	1	..	..	..	..	46	7.6%
Quietness	1	18	..	1	..	2	1	23	3.8%
Being sold by relative or friend	3	15	2	1	..	1	1	22	3.6%
Dependability	1	14	..	..	..	..	1	16	2.7%
Advertising	3	7	1	..	..	..	..	11	1.8%
Sanitary features	1	4	..	..	..	..	..	5	.8%
Unit on top	..	4	..	..	..	..	..	4	.7%
Dessert-making features	1	2	..	..	..	..	..	3	.5%
Flat on top	3	..	..	..	..	..	..	3	.5%
Cost	1	1	..	1	..	..	..	3	.5%
Guarantee	..	2	..	..	..	..	..	2	.3%
Constant temperature	2	1	..	..	..	..	..	3	.5%
Radio program	..	1	..	..	..	..	..	1	.2%
Using gas	..	..	..	..	..	1	..	1	.2%
Husband wanting it	..	..	..	..	..	..	1	1	.2%
Hydrator	1	..	..	..	..	..	..	1	.2%
								604	

NOTE: Percentages taken from total number of reasons given (604), not number of people stating preference. In some cases, two reasons for preference were offered.

SURVEY QUESTIONNAIRE—1930

Street.....House No.....City.....Man or Woman

1. WHAT TYPE OF REFRIGERATION DO YOU USE?

Ice ☐ General Electric ☐ Zerozone ☐
 Copeland ☐ Kelvinator ☐ None ☐
 Electrolux ☐ Norge ☐ Other ☐
 Frigidaire ☐ Servel ☐

a. If electric refrigerator, when was it purchased?.....

2. WHY DID YOU CONSIDER THAT ELECTRIC REFRIGERATOR BEST?

(Skip to Ques. 8 for people answering No. 2.)

3. WHAT MAKES OF ELECTRIC REFRIGERATORS ARE YOU FAMILIAR WITH?

Copeland ☐ General Electric ☐ Norge ☐
 Electrolux ☐ Kelvinator ☐ None ☐
 Frigidaire ☐ Zerozone ☐ Other ☐

4. IF YOU WERE GOING TO BUY AN ELECTRIC REFRIGERATOR NOW, WHICH WOULD YOU PREFER?

Copeland ☐ General Electric ☐ Norge ☐
 Electrolux ☐ Kelvinator ☐ None ☐
 Frigidaire ☐ Zerozone ☐ Other ☐

5. WHY DO YOU PREFER THIS MAKE?.....

6. WHAT ELECTRIC REFRIGERATOR ADVERTISING HAVE YOU SEEN?.....

7. DO YOU KNOW WHERE THE LEADING MAKES OF ELECTRIC REFRIGERATORS ARE SOLD?

Frigidaire Kelvinator
 General Electric

8. WHAT NEWSPAPERS DO YOU READ REGULARLY?

Times ☐ Examiner ☐ Herald ☐ Express ☐ Record ☐ Daily News ☐
 Others:.....

INVESTIGATOR.....

Date.....

Write any interesting comments on reverse side.

Table 5

Question No. 4 (IF YOU WERE GOING TO PURCHASE AN ELECTRIC REFRIGERATOR NOW, WHICH WOULD YOU PREFER?)

Of the 1,065 people who used ice, California Coolers, or no refrigeration, 1,041 knew one or more makes by name; 565 or 53.1% of the 1,041 would state no preference; 476 or 46.9% of the 1,041 stated a preference.

Of the 476 non-owners who stated a preference:

109 or 22.9% preferred No. 1
293 or 61.6% preferred No. 2
24 or 5.0% preferred No. 1 or No. 2
14 or 2.9% preferred No. 3
3 or .6% preferred No. 4
5 or 1.1% preferred No. 5
9 or 1.9% preferred No. 6
4 or .8% preferred No. 7
15 or 3.0% preferred all other makes combined.

in a very strong position. Naturally, we were pleased, because it indicated that our efforts were mainly being directed in the right way, but, of course, we did not make the survey to flatter ourselves. We wanted to know our strength and our weakness, and our survey has revealed much of both to us. That is what any good survey should do.

PRODUCTION ADVANCED ON NEW DRY-ZERO PRODUCT

Chicago, Ill.—A new Dry-Zero pliable slab is announced by Harvey B. Lindsay, president of the Dry-Zero Corporation, Chicago.

According to Mr. Lindsay this new pliable slab, the result of many years of research, embodies other improvements in addition to its low conductivity of .221. One of these is "cushion action," gained by a finer graining of the batt. This graining increases the natural resilience and assures a pressing action against the porcelain liner of a cabinet filling any irregularities. The other side of the pliable slab has a rigid backing, allowing much easier handling in cabinet production.

A \$100,000 addition to the Chicago factory of Dry-Zero has been made to provide for increased production on this new pliable slab.

WATCHES, DIAMONDS AND COPELANDS

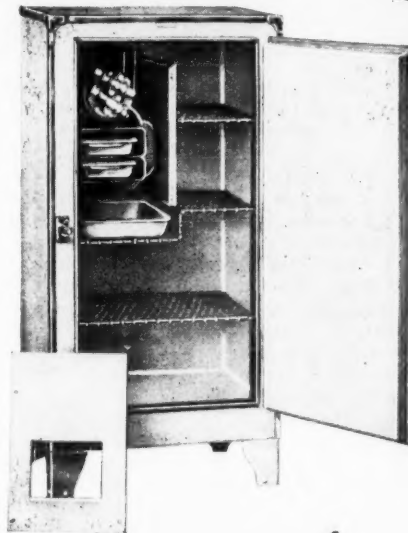
Detroit.—According to the Copeland Refrigeration Company of Detroit, C. C. Jenks and A. W. Leodler, of Ypsilanti, are believed to be the first jewelers in this country to take on a line of electric refrigerators.

Organizing their Copeland business under the name of Washtenaw Copeland Sales Company, they have sold fourteen household units and ten commercial jobs since May.

KLEIN REPLACES MALONE

Seattle, Wash.—Lawrence Klein has been appointed to take over the position as Pacific district manager for the Kelvinator Sales Corporation. He replaces Gordon J. Malone, who is leaving for Detroit to assume new duties.

ALL-STEEL APARTMENT-HOUSE CABINETS



Contractors and builders everywhere testify that Crystal All-Steel Apartment House Cabinets reduce the cost of each job, because more than the usual number can be hooked up with one compressor. Scientific design, perfected by 20 years experience in building all-steel refrigerators—pure cork insulation sealed between air-tight walls—make the Crystal amazingly efficient with any type ice machine.

Special Sizes

When space is limited and plans make a special size cabinet necessary, install Crystals. Our organization is able to supply exactly what you need on the delivery date you specify.

Colors

Tenants now demand color in refrigerators. Crystal is ready to meet that demand for you. Your installation of Crystal cabinets may be white or in any color or combination of colors—or the cabinets may be assorted colors. Write today for more information about Crystal Apartment House Cabinets.

Crystal

No. 521, our most popular stock model. 5.2 cu. ft.—6 1/2 sq. ft. shelf space. Removable front handle. Porcelain drip pan. 22 1/2" wide, 45" high, 17 1/2" deep, 40" high, without legs. ANY COLOR. Special sizes to meet your exact requirements. Get details now.

CRYSTAL REFRIGERATOR CO.

Factory and Main Office : Fremont, Nebraska
 Eastern Office : 1011 Chestnut St., Philadelphia

HERE IS THE AMAZING NEW STREAMLINE FITTING

for Electric Refrigeration

Providing

SEALED CONNECTIONS

Without Nuts or Flares!

The New Mueller STREAMLINE Refrigerator Fitting is a permanently tight connection for Electric Refrigeration work—a fitting actually STRONGER THAN THE TUBING WHICH IT CONNECTS—yet much lighter, simpler, more quickly completed and more economical than any previous type of refrigerator fitting.

The end of the tube is slipped into the fitting, the proper distance being made positive by a shoulder inside the fitting against which the tube rests. Solder wire is fed in through a conveniently located opening in the fitting by applying heat from the blow torch.

The solder is thoroughly distributed around the joint by CAPILLARY ATTRACTION and in a few seconds a connection is completed that is refrigerant, seepage and vibration proof.

The STREAMLINE Fitting represents a remarkable saving of time and labor, as well as giving absolute assurance that every connection is both perfect and permanent. No flaring is necessary, and there is no waste "endage." The fitting itself is lighter, meaning a considerable saving in weight. Inside diameter of the fitting is the same as that of the tubing—there are no uneven surfaces or obstructions. MATERIAL AND INSTALLATION COSTS ARE CUT APPROXIMATELY IN HALF.

Mueller STREAMLINE Refrigerator Fittings, with the exception of the couplings, are FORGED. The coupling is made of extruded seamless copper tube. Forgings being made in dies under tremendous pressure, have a dense, close-grained structure that makes seepage through the fitting itself, impossible.

A Complete Line of both Flared Type and STREAMLINE Refrigerator Fittings are carried in stock and available for Prompt Shipment.

Mueller STREAMLINE Electric Refrigeration Fittings can be made to suit your special requirements.



STREAMLINE Tee, copper to copper to copper
 Patent 1,770,852—Other Patents Pending



STREAMLINE Coupling, copper to copper
 Patent 1,770,852—Other Patents Pending



STREAMLINE Elbow, copper to outside pipe thread
 Patent 1,770,852—Other Patents Pending

Mueller Brass Co.

Port Huron, Mich.

THREE GENERATIONS OF BRASS MAKING

Sulphur Dioxide!
For Direct Charging!
 Every Container Analyzed
 "Pure" Bone Dry Cylinders
 2 to 150 lbs.

ANSUL
 Chemical Co.
 MARINETTE, WIS.

Also...
 Ton Drums—Tank Cars.

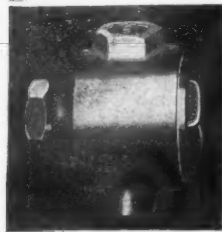
H. W. Burritt
in Action

Why Waste Water?

INSTALL THE "EBCO"

SELF-CLOSING
AUTOMATIC
STREAM
CONTROL
VALVES

A constant drinking stream which never varies in height or volume regardless of any pressure variation in the water lines, is assured when drinking fountains are equipped with EBCO Valves.



REGULATOR

for installation in water supply lines to present fountains 1/2" I. P. Inlet and Outlet.

Automatic control of the stream height is guaranteed under all fluctuating pressures between 20 and 120 pounds. The "EBCO" valve insures economy and eliminates objectionable squirting.

Write for Complete Catalog of EBCO Valves and Drinking Fountains.

EXPOSED TYPE
Chrome plated union inlet—1/2" I. P. outlet, C-1300 2-prong handle, C-1300 H-4 prong handle, C-1300 L-Lever handle.

THE D. A. EBINGER SANITARY MFG. CO.
COLUMBUS, OHIO

Manufacturers of EBCO Drinking Fountains, Ventilated Urinals and Closets, Round Wash Sinks and Steel Compartments for toilet rooms.

KELVINATOR DISTRIBUTORS PREPARE FOR BIG YEAR

(Concluded from Page 1, Column 1)

the high spot of the convention. Mr. Burritt presided and, by scheduling a series of brief speeches between courses, kept things moving smoothly throughout the evening. The chief speakers were Mr. Mason, Howard Lewis, treasurer of the company, and Merle Thorpe, editor of *Nation's Business*. Mr. Lewis made an address which showed the commanding position which the refrigeration industry has attained in the minds of the financial world. His speech is printed in full on this page.

Mr. Thorpe reviewed business conditions, and declared that the present depression was largely a mental attitude that would be swept away when the American public realizes the situation. Judd Sayre was in the chair when the Tuesday morning session began in the Little Theatre. A speech on Direct Mail was delivered by Verneur E. Pratt, editor of *Direct Mail Selling*. The other speakers were all Kelvinator men, Mr. Fernald, E. A. Seibert, service manager, Mr. Burritt and Mr. Mason.

Just before Mr. Mason was to speak there was an interruption. E. E. Rawl, of Greenville, South Carolina, climbed on the stage and said that he thought the distributors ought to be heard. He called on George E. Helms, of the King Mantel and Furniture Co., of Knoxville, Tennessee, who has been a Kelvinator distributor for eight years. Mr. Helms came forward from his seat in the audience and gracefully offered the thanks of the distributors for the support accorded them by Kelvinator officials, from Mr. Mason down. It was a spontaneous tribute that accentuated the fine spirit of the convention. Mr. Mason then concluded briefly. Addressing the distributors directly, he said: "Without you we can't last. With you we can't lose. Full speed ahead."

On Tuesday afternoon most of the visitors went out to the Kelvinator plant where they saw production in full swing. Some of them remained in town for a day or two but most of them were on their way home Tuesday evening all set for a big Kelvinator year.

WOOD AND RICK ADVANCED

Detroit, Mich.—Announcement is made by the Kelvinator Corporation of arrangements which will place the company in a position to render better service to the utilities.

Campbell Wood, continuing as director of sales of the utility division, expects to spend more time at the Detroit office than heretofore, especially since men have been appointed and stationed at the company's New York and Chicago offices.

H. A. Rick will represent the utility division at New York, with offices in the Equitable Building, 120 Broadway.

S. R. Kemp will represent the utility division, with headquarters in the company's Chicago office at 160 East Illinois Street.

Campbell Wood has been with Kel-

vinator since 1925 and has served in the capacity of wholesale and retail branch manager at Baltimore and Washington, D. C., respectively. He has acted as special representative, as a district manager, and as sales manager for the Eastern district. A year and a half ago he was placed in charge of the utilities division.

H. A. Rick, who goes to the New York Utility office, has been with The Electric Bond and Share Company for several years, during which he has been in close contact with the directors of properties both here and in foreign countries.

S. R. Kemp, who goes to the Chicago utility office, has been with Kelvinator for a year, working as a sales department field representative in Kentucky, Tennessee, Arkansas and Ohio.

VETERANS MOVE UP

Detroit, Mich.—The appointment of two veteran district managers as regional managers was announced recently by the Kelvinator Corp.

R. I. Petrie becomes regional manager for all the eastern territory of the United States from the Rocky Mountains to the Atlantic seaboard, with headquarters in Detroit.

J. S. Cortines becomes regional manager for the Rocky Mountain states, West Coast and Southwestern states, with headquarters at Los Angeles.

Mr. Petrie has served Kelvinator in various capacities—as district manager, manager of the New Business department, and manager of Refrigeration Discount Co., a Kelvinator subsidiary.

Mr. Cortines joined the Kelvinator Corporation in 1925 as a district manager. He has served in various districts in the southwest, but for some time now has operated in the large territory comprising Washington, Oregon, Colorado, Texas, Oklahoma and New Mexico.

PIONEER MUSIC HOUSE ADDS ELECTRIC REFRIGERATION

Portland, Me.—Cressey & Allen, of this city, the oldest musical house in Maine, have been appointed dealers for the Westinghouse electric refrigerator in Cumberland and York counties. A display room was opened to the public in their store at 534 Congress Street on October 6. The firm has specialized in pianos, musical merchandise and radios for the past 50 years.

Refrigeration Industry Gains High Rank in Business World

(Address of Howard A. Lewis at Kelvinator Convention)

I HAVE two points that I can outline in fifty words, which to me represent this over-all picture that we face during the next six months.

"Number 1, we are lucky today to be in the refrigeration business.

"Number 2, the banking fraternity, your best local publicity agents this winter, plus.

"We are lucky today to be in the refrigerator business.

"Industry against industry, competing for the consumer's dollar—that is the story that has been told to us, and that we have read about and thought about. I wish to modify that for today, and say it is industry against industry, competing for the consumer's credit facilities.

Broadly speaking, today the time payment banker controls the flow and distribution of specialty merchandise. The time payment banker knows not only what the public can be sold, but what the public will pay for; what the public will pay for month after month, following the sale. That is the crux of 1931 merchandising problems.

Repossessions At Low Mark

"Seventy-five per cent of Kelvinator's sales were sold on time last year. It will probably be a larger percentage this year. Redisco, our own finance company, four years old, with a history of repossessions of less than one-tenth of one per cent; that is refrigeration paper with a splendid pay-out history, a pay-out history where the 60 days delinquencies on contracts that you gentlemen have sold is unequalled by any other commodity sold on time.

"So successful, so successful have we in Kelvinator been, with our financing history, in terms of the public's willingness to pay after purchase, that one of the largest if not the largest independent time payment banking house, has just reduced its rate on refrigeration paper.

"As a corollary of that, gentlemen, this same time payment banking house and the other large time payment banking houses are increasing their rates on many commodities that compete with us

today for the consumer's credit facilities. The independent banker in the time payment field is making it easier for the public to buy refrigeration, and more difficult to buy other commodities. Industry competes against industry, but today we sit with the time payment banker, who has his hand on the throttle of distribution, giving us in this business the breaks. Why? A banker will loan money if and as he knows he will be repaid, particularly if he knows he will be repaid on schedule.

"Gentlemen, I say again, we are cashing in on four years of history with the public. Let us take our hats off to Redisco, let us recognize that they, during this period, have pioneered in this refrigeration time payment business, and that we have a history which hard-headed independent bankers recognize has no other equal in any specialty sold today to the American public.

"Gentlemen, I say again, we are lucky today to be in the refrigerator business.

"The banking fraternity, your best local publicity agent this winter, plus. Why?

"The first of October, at Cleveland, this year, the American Bankers Association met in annual convention assembled, and for the first time in the history of these United States a President of these United States addressed that organization while in office. If any of you read his speech, you probably interpreted it the same way that I interpreted it. He said to this great banking fraternity, 'Lead America out of this period of depression.'

"And where do the bankers find themselves today? A shortage of sales ammunition of a financial soul-saving kind. Our friends, as somebody has described them, the glass-eyed bankers, are in the position today of being asked to be evangelists, and that is a problem. But I will say this, give a member of the banking profession a story of net profits, a story of profits repeated for the second year plus, a story of net profits increased with cash in the bank, or equivalent, and make these audited stories, and then our banking friends, you will find, will become as vociferous as Billy Sunday, with as much emotional 'it' as Amy McPherson.

David and Goliath

"Roughly speaking, there are 26,000 commercial bankers—state, federal and private. Add together all of their officers, add together all the directors, and you have a small army of 300 to 500 thousand financial minded people, who, if you please, find themselves cast in the role of David, to battle with this Goliath called business depression. I would refer you to Samuel 1, Chapter 17, for details of that glorious battle.

"For those that do not know, or remember, Samuel 1 is a book in the Bible.

"Kelvinator's 1929-1930 financial story is a glorious one. It will be released within a few weeks, this winter, and it will be a story of net profits, a story of increased net profits, a story of two years' continuous upward success, after a period which amounted to a debacle. Kelvinator's story today is ten times more valuable than the size of our business warrants. Why? Timely, it is a perfect example of what can be done. If you please, it is a round stone for David's sling, to hurl at Goliath. If you will refer to Samuel 1, Chapter 17, verse 40, you will find that before the famous battle David betook himself to the brook, and after much and careful selection located five round stones. If I were a preacher talking to that text, I would devote more time to that hunting for those round stones, because if any of you gentlemen, in your youth, used a sling shot, you remember how essential it was that your stone was round.

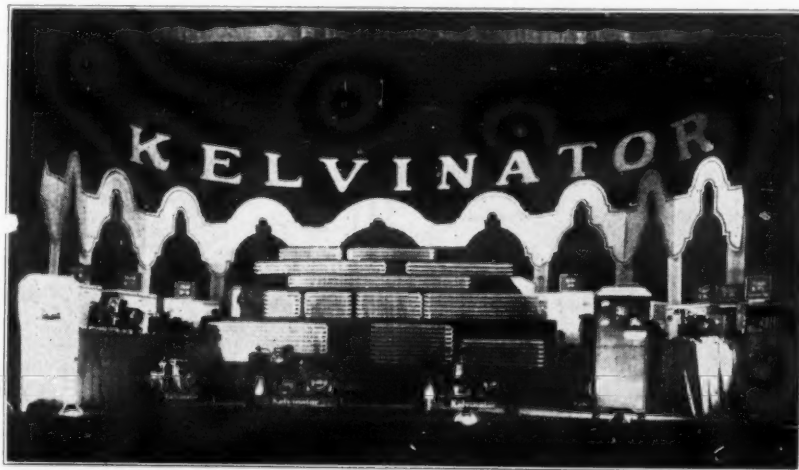
Hunting for Round Stones

"I say to you gentlemen, that there are 300 to 500 thousand financially minded men, who feel the weight of the task that has been put upon their shoulders by the President of the United States, and the economics of the situation, who are down in their respective brooks, in their local communities, hunting for five round stones. Bring them, give them a round stone which they can sling at Goliath, locally, and they will love you as David loved Jonathan. I again refer you to the Bible.

"Remember this: Maybe some of you gentlemen do not, in your daily work, have detailed contact with bankers, but from morning until night a banker talks and advises with everybody worth while in his community. He is a business doctor, a counsellor. They are hunting for evidence, facts, provable facts, and so I say to you this: That the time has come, or will come very shortly, when you can go, and go programmed, to the financial men in each of your communities, with the 1929-1930 Kelvinator balance

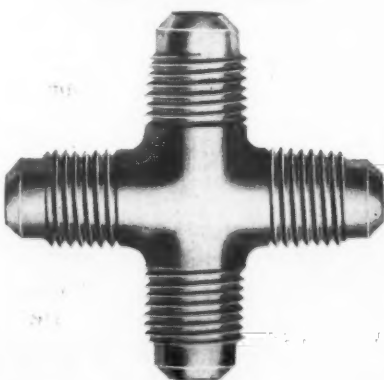
(Concluded on Opposite Page)

The 1931 Commercial Line



Coils and more coils filled the stage

SEEPAGE PROOF FITTINGS



ALL combinations of pipe and tube ends in the most complete line of fittings on the market for Automatic Refrigeration.

Send for Catalog No. 36

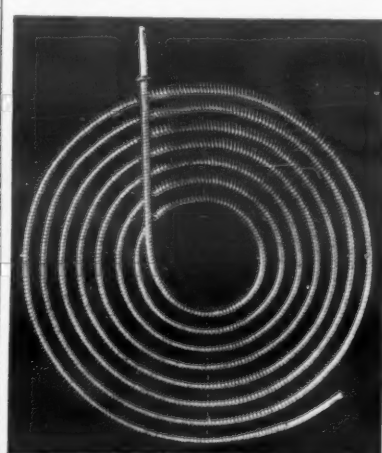
COMMONWEALTH BRASS CORPORATION

Commonwealth at C. T. R. R.

DETROIT

PATENTS

Searches, Reports, Opinions by a Specialist in REFRIGERATION
H. R. VAN DEVENTER
Solicitor of Patents - Refrigeration Engineer
342 MADISON AVE. NEW YORK



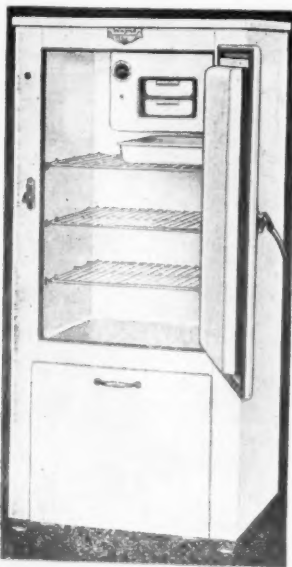
Specify ROME-TURNEY CONDENSERS

Made of heavy gauge deoxidized seamless copper tube. One-piece construction. High efficiency. Designs for all requirements and conditions.

Rome-Turney Radiator Co.

ROME, N. Y.

NEW HEATPROOF CABINETS



When a Wayne starts to pull the heat out of this new cabinet, it has an easy job.

Why?

Because the Wayne cabinet—porcelain inside and out—is **HEATPROOF**—designed for Wayne by Seeger, and because the Wayne compressor has ample capacity.

The Result?

The power bills are lower—and your customer is happy; the machine does not lal or at its job—your servicing costs are a minimum—and YOU are happy. At this new low list price, Wayne will earn real profits for every dealer handling it.

\$159.50

List

Write us today. We'll send you full particulars.

THE WAYNE HOME EQUIPMENT CO., FORT WAYNE, INDIANA

WAYNE
ELECTRIC REFRIGERATOR

INTERESTING THE BANKER

(Concluded from Opposite Page)

sheet in one hand, the Kelvinator catalogue in the other, your chest swelled out, and your mouth full of the story of this convention. And, gentlemen, you will get a hearing, you will get an interest, the like of which you never dreamed of.

"Let me give you a few examples of what it means. Four weeks ago, in New York, in one of the biggest banks, our New York office was wrestling with one of the largest builders in this country, and certain members of their personnel were opposed to Kelvinator. In the course of my discussion with this particular banker, I told him our troubles. He looked at me in a curious way and he said, 'Do you know who that is sitting there in the line next following you?' I said, 'No.' He said, 'That is the treasurer of the firm you are talking about, and here on my desk are the papers dealing with a two million dollar loan.' I said, 'Did you hear my story?' He said, 'Certainly.' I said, 'Will you co-operate?' He said, 'Delighted to co-operate.' And, this minute he is co-operating.

The Banker's Part

"Another story. The following week, this happened with another banker in New York. After meeting some of the vice-presidents, we go to our New York office, and find an apartment house has gone sour, and a bank has taken it over. We find it is the bank I have been talking to in the morning. We call them on the phone and find that the placement of an order involving \$18,000 rested in the hands of an assistant cashier of one of those branches.

"The same institution—met some of the officials who are directors—find one of the largest and best finance companies in this country dealing with first mortgages. Met the president and the director in the elevators between the sixty-sixth and something down floor. The other man said, 'Kelvinator.' I said, 'Half a minute's worth in an elevator going down.' He said, 'Sure, I get that. I understand you fellows are doing fine.' And then he began to tell me the rumors he heard about Kelvinator, and he was ready to co-operate.

"Right here in Detroit a trust department, a trust officer handling certain estates, an unsung financial David, if you please, who has on his desk, or had on his desk the placement of orders involving the re-equipping of some old apartments in terms of new and modern refrigeration. An unsung David in the financial picture, anxious and hungry for things that are financially sound, sensing his responsibility, and sitting there ready to listen to our story of Kelvinator and its accomplishments.

Influence on Buying Habits

"Probably the most practical example, and I imagine it will be the most practical example of all times, of bankers' influence in changing the buying habits of people, and of a country, of a nation, is what happened this February just past in England, when the Bank of England, old conservative Bank of England, buys a 50 per cent interest in a 'hire purchase' or time payment com-

pany, thereby directing and controlling the flow of merchandise to the British public. And four years ago, gentlemen, when you tried to get goods sold, on 'hire purchase,' as they called it, in England, you were considered to be bordering on a loan shark game. Three years ago it was nearly the same. But here the wheel of fortune turns, and we have a great banking institution, because of economic conditions, putting its stamp of approval on a method of merchandising that is part and parcel of our thinking.

"During the last twelve months I have spent most of my time in the presence of bankers, big city bankers in America, and small town bankers in America. Canadian bankers, English bankers, German bankers, Swiss bankers, French and Italian bankers. And I would tell you this: I viewed many so-called 'glass eyes' and some looked more like agate and some looked like crystal, but I have yet to see a financial eye, when they heard in part the story of Kelvinator's progress, that did not begin to brighten and glow and in a husky voice of emotion, the banker always wanted to know if he could not do business with us.

"Why? They wanted to tie to a company that was proving it could be done, in terms of net profit.

"I say to you gentlemen this: This is not an abstract something; it applies to every one of you in your personal contacts. Within a relatively few weeks or months, you will have in your hands the kind of a story that makes the ammunition that the bankers of this country want to talk and think about, to broadcast locally, because it is a stone helping to keel the Goliath of depression. And I say to you, you will find every financial man down in the brook locally, hunting for round stones. Take the Kelvinator stone, take it with your compliments, to these local financial Davids, and several things will happen: First, you will get local publicity, the like of which you never knew existed—word-of-mouth publicity.

"Second, you will establish valuable personal contacts, which will produce the thing this convention represents—orders, orders, orders. Gentlemen, I thank you."

COPELAND DETROIT BRANCH ANNOUNCES PROMOTIONS

Detroit.—William E. Harper has been appointed supervisor of the distributor organization in the state of Michigan for Copeland electric refrigeration. For a number of years, Harper was in the meat business, but during the last four years he has been connected with the electric refrigeration industry, principally in the capacity of selling commercial equipment.

C. J. Camp was promoted to the position of supervisor of the city dealer organization for the Copeland Refrigeration Company of Detroit.

SEVEN FOR APARTMENT

Poughkeepsie, N. Y.—The Wallace Company has installed seven General Electric refrigeration units in the new Rinaldi apartment house.

LEONARD WILL MARKET ELECTRIC REFRIGERATOR

Detroit, Mich.—With fifty years of experience in home refrigeration, the Leonard Refrigerator Company celebrated its golden anniversary by announcing that the company is to market an electric refrigerator. A jobbers' and dealers' convention here was made the occasion for the announcement.

Two models of the Leonard electric refrigerators—5-foot and 7-foot—will be sold. Leonard also announced its 1931 ice refrigerator line, stripped to 16 moving numbers, with prices scaled from lowest upward.

Features of the Leonard electric are tested insulation and the chillometer, a cold switch-board controlling device let into the face of the ice cube tray shield. Just above the chillometer is the defroster, a current cut-off switch that defrosts the coils.

Forty-two ice cubes are produced at one freezing in the 5 cu. ft. Leonard electric; 81 in the 7 cu. ft. model. A flexible rubber cube grid also is furnished.

"The Leonard electric is true over-the-counter merchandise," says A. H. Jaeger, first vice-president and sales manager. "The matter of servicing has been reduced to a detail. With all our manufacturing care and good design, the need for service is very unlikely, but should it occur, the dealer attends to it with no extensive service payroll. A unit shipping case has been devised, which is also an installation tripod. Servicing is a matter of 30 minutes.

"We have always been in the ice refrigerator business and will continue to be with unabated interest, but there exists still another and totally different refrigerator market for electric. We discovered long ago that the two markets do not meet or overlap, and so our two lines, ice and electric, will therefore proceed each as if the other did not exist. From the dealer's standpoint, ice leaves off where the electric begins."

PROMINENT FRIGIDAIRE DISTRIBUTOR DIES

Spartansburg, S. C.—John Finley, distributor in this district for the Frigidaire Corporation, died here on October 15. Mr. Finley was a resident of Dayton for a number of years and was widely known. He was one of Frigidaire's most successful distributors, having held important posts with the corporation at Joplin, Mo., Denver, Colo., and Asheville, N. C., before being transferred to the Spartansburg territory two years ago.

He was born in Kenton, Ohio, 37 years ago. Mr. Finley attended Miami University, Oxford, Ohio, and later the School of Finance at Dartmouth. He first joined the Delco-Light Company, later transferring to Frigidaire Corporation, where his rise was rapid. He leaves his widow and one son. Death was due to an acute attack of appendicitis, following a second operation from which he failed to rally.

SEATTLE ICE-O-MATIC FIRM IN NEW LOCATION

Seattle, Wash.—A new location has been taken by the Seattle Heat & Cold Corporation, Ice-O-Matic representatives. Formerly located at 2100 Second Avenue, Seattle, this business has been moved uptown at the corner of Olive Way and Broadway. J. F. Ernsdorf is manager.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Electric Refrigeration News, published every two weeks at Detroit, Michigan, for October 1, 1930.

STATE OF MICHIGAN,

COUNTY OF WAYNE, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Geo. N. Congdon, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the Electric Refrigeration News, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and, if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, F. M. Cockrell, Detroit, Mich.

Editor, Wm. Jabine, Detroit, Mich.

Managing Editor, John Dittler, Detroit, Mich.

Business Manager, Geo. N. Congdon, Detroit, Mich.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Business News Publishing Co., 550 Maccabees Bldg., Detroit, Mich.
F. M. Cockrell, 18090 Wildemere Ave., Detroit, Mich.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

GEO. N. CONGDON.

(Signature of editor, publisher, business manager, or owner.)

Sworn to and subscribed before me this 1st day of October, 1930.

SEAL ANNA SACHS.
(My commission expires August 17, 1934.)

Be Safe in Sulphur Dioxide Fumes with the PULMOSAN CANISTER RESPIRATOR



No. 53 PULMOSAN Canister Mouthpiece Respirators, with flexible tubing, and positive flutter valve, give positive protection against SO₂ fumes.

Air-tight goggles can be supplied.

Mail The COUPON

PULMOSAN SAFETY EQUIPMENT CORP.

176 Johnson St.
Brooklyn, N. Y.

PULMOSAN SAFETY EQUIPMENT CORP.
176 Johnson St., Brooklyn, N. Y.
Gentlemen: Send us full information on your No. 53 Mouthpiece Canister Respirator.
Name _____ Address _____
(E. R. N.)

"Full Speed Ahead"



President Mason and Treasurer Lewis Discussing Sales

The Purest Sulphur Dioxide EXTRA DRY

Made by our exclusive patented process.

ESOTOO

Trade Mark Reg. U. S. Patent Office

Made expressly for refrigerating use. Analysis guaranteed to show not over 50 parts of moisture per million.

Carried in stock by our Agents everywhere. Write or wire us where we can serve you.
VIRGINIA SMELTING CO. ♦ ♦ ♦ West Norfolk, Virginia
F. A. EUSTIS, Secretary 121 State St., Boston, and 75 West St., New York

KEROTEST FORGED BRASS FITTINGS



The Kerotest line of Brass refrigerator fittings is most complete—a size, shape and type for your every purpose.

Write for complete, illustrated Bulletin giving sizes, description and prices.

KEROTEST MANUFACTURING COMPANY
PITTSBURGH, PA.

NEW ODORLESS VARNISH PLACED ON MARKET

THE manufacturers of mechanical refrigeration equipment, as well as household ice boxes, have had many problems beyond the purely electrical development phases of refrigeration to solve. Among them is the securing of a material for liners and interiors that would not warp or cold flow and would not be affected by foodstuffs.

The new odorless Durez varnish, made by General Plastics, Inc., has been put forward as a solution of this problem, and laminated board is now used by manufacturers of refrigerators. This board is light, tough, moderately flexible, impervious to moisture, and has a permanent finish. Until it could be made odorless, it was practically useless in refrigeration work.

The new Durez 285 odorless varnish is furnished either in black or natural

colors. The viscosity range is held within very close limits, running L to M on the Gardner-Holdt scale. The available resin content is also held close.

Filler sheets are impregnated after the usual manner, dipping the paper in the varnish and heat-treating it to dry off the solvent and advance the resin to a point where it can be molded to best advantage. The heat treatment is generally done at about 250 degrees F., either in a tower or a continuous tunnel operation.

GOODMAN LOCATES IN PITTSBURGH

Pittsburgh, Pa.—I. H. Goodman has joined the Kelvinator-Leonard Corp. here as sales manager. Mr. Goodman was general manager of the J. J. Bantlin Co., former distributors for Kelvinator in the Cincinnati territory.

CALCO Sulfur Dioxide

"Buy the best, by every test"

Cylinders - Drums - Tank Cars

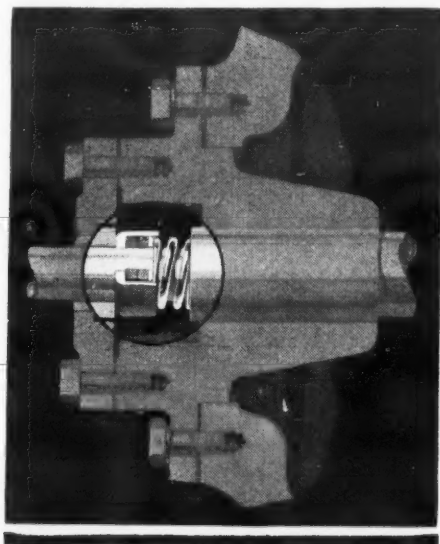
THE CALCO CHEMICAL CO., INC.

Bound Brook, N. J.

New York

Boston

Philadelphia



Lower your Service Costs -at the Factory!

Leaking refrigerant, noisy action, inefficient operation, are practically eliminated at the factory by those manufacturers who equip their machine with the Cooke Seal Ring.

It is leak-proof. The most volatile refrigerant cannot get by its smooth-running ground joint. It does not squeak or overload the motor.

And for dealers faced with the servicing of machines not Cooke-equipped, it is good news to realize that they can repair, on the job, with a minimum of time and labor, worn out packing or other types of seals with the Cooke Seal Ring.

It costs less than any other type of seal and it will last indefinitely.

Dealers and manufacturers will be wise in using this coupon now.

COOKE Seal Ring

20 N. GREEN STREET CHICAGO, ILLINOIS, DEPT. D

Cooke Seal Ring,
20 N. Green Street, Chicago, Dept. D.
Please tell me more about Cooke Seal Rings.
Name.....
Address.....
City..... State.....

SERVICING THE REFRIGERATOR

By-Pass Valve Very Useful in Multiple Installations

By Arch Black

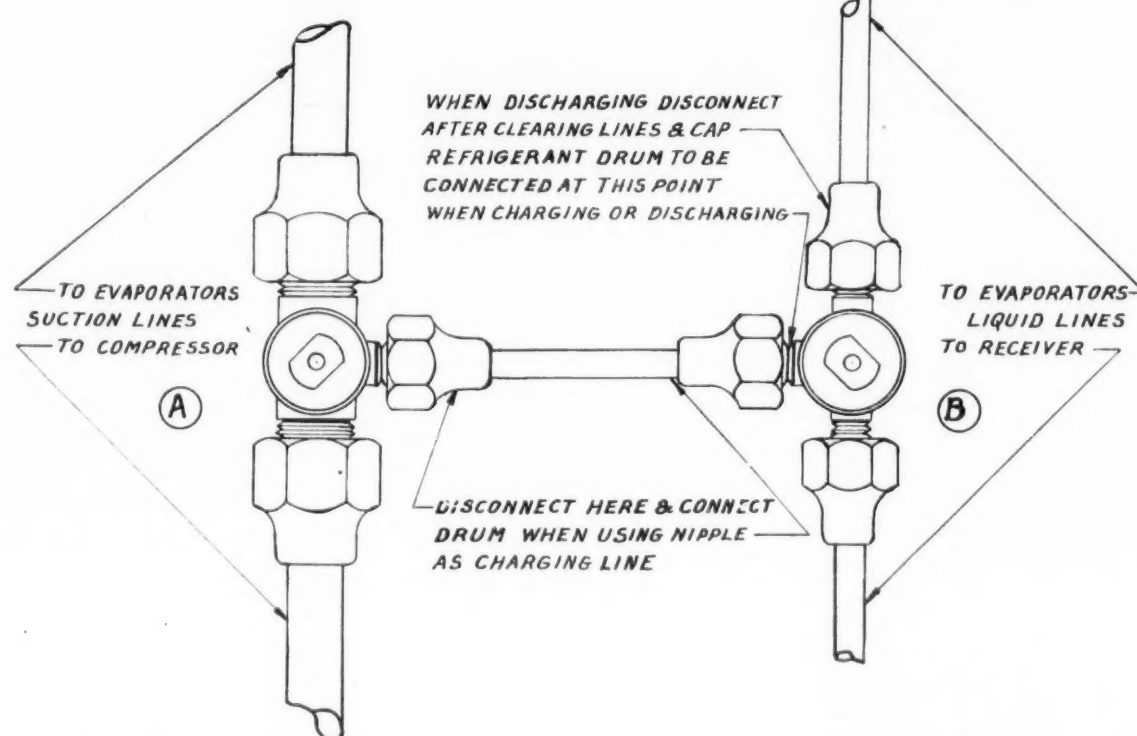
MECHANICALLY operated devices should always be installed with the thought that at some future time service work will probably be required. This fact often seems to be forgotten or no heed paid to it when an installation of any mechanical device is being made.

Refrigeration servicemen have at some time had cause to feel peeved at some of the manufacturers' engineers for placing valves or parts in the most awkward positions. When this is brought to the attention of the engineers, changes are very often made at the expense of the manufacturers. In the case of the installation of a refrigeration system changes are not often so readily made, the servicemen having to spend much more time on the job, and that naturally displeases the customer. Many installation men set up systems with no thought regarding service, knowing that

liquid line valve, and at this point connect liquid refrigerant drum. With receiver valve closed and temporary charging line purged, open drum valve and liquid line valve (B). Refrigerant will then take its course to the one or more evaporators in the system. As each one is filled the float valve will close off and the serviceman can ascertain by the sound in the boiler or evaporator whether heat need be applied to the refrigerant drum or not. The compressor may be allowed to operate for a short cycle to relieve some of the pressure in the boilers, if necessary. Having supplied sufficient liquid refrigerant, close valve on drum and open receiver valve, and allow machine to operate, and ascertain if system has full charge or not. Charging the system in this manner means that the boilers have filled and the liquid line and the charge in

tem has been operating for a considerable period, oil-bound boilers and pockets are often the cause for service work. The oil apparently collects over varying periods, but there is no necessity to encourage too much oil to get into the system and some of it gets trapped the first time a system is charged.

Now take the case of the serviceman on the job where the two valves have been installed in the lines. He can go to work and connect the gauges on the machine to stay there throughout the entire operations of charging or discharging a system, and as the valves should be accessible and as near the compressor as possible, it makes it easy to add or discharge a little refrigerant as required. By charging a system through this valve it also eliminates the possibilities of the oil blanket in the receiver being forced into the system. Re-



they will not have to service their own work. If every installer worked with the thought that they themselves might be the next to service the job, the entire installation would be better from many angles. Although the installer has to spend another hour or so on the installation to run the lines another way, or install a valve, or spend a little time on thought, that time is made up when the serviceman makes a call. The serviceman does the job more thorough and in less time. The customer's service bill is not so high, and therefore boasts the make of equipment, which means good for the manufacturer.

By-Pass Valve is Useful

In most multiple installations, or where there is a long run of liquid line, a by-pass valve when installed is usually found by the serviceman to be very useful. The by-pass valve consists of a three-way valve teed into the suction line with a 1/4-inch flared tube branch and a short piece of 1/4-inch tubing leading to a 1/4-inch tee on the liquid line. This valve is, of course, kept closed while the system is working normally, and only opened, with receiver valve closed, when the serviceman is required to pump the liquid line clear.

Most servicemen will agree that this is the most efficient way to remove liquid in the line. Although the by-pass valve is only put to use for the purpose of clearing the liquid line, this alone makes it a great asset from a service point. After the installer has decided that a by-pass valve would be of use in a particular installation, if he replaces the 1/4-inch tee by a 1/4-inch three-way valve, as shown in the diagram, he will find that he has installed a useful set of valves.

For instance, in the case of charging the system with liquid refrigerant, have both valves open, proceed in the usual manner and draw a vacuum. Being satisfied on this point, close both valves and disconnect short nipple leading from a suction to liquid line, at

the condensing unit has not been interfered with.

As often happens, factory-charged condensing units are found to be over-charged or short. Should the system show signs of an over-charge, cool refrigerant drum and open drum valve. If system is found to be short, close receiver valve and heat drum. When satisfied as to charge, clear out temporary charging line, by heating, and close valve (B), and connect short 1/4-inch nipple from valves A to B, leaving both valves closed. Charging a system through the low or suction side of a compressor, a very safe method, is far too slow, and the common practice of servicing a system is to charge the refrigerant through the head of a compressor. Unless when there is a charging valve on the receiver and a port on the compressor head for a gauge, the serviceman must go to the trouble of teeing a gauge on the charging line or spend time to connect the gauge on the head, get the reading, disconnect it, connect refrigerant drum, and again connect the gauge.

Oil Blanket

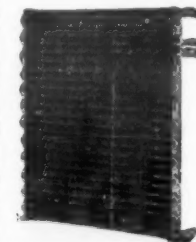
In fact, this work of connecting and disconnecting, servicemen will agree, is very often done two or three times before being satisfied as to the refrigerant charge and again when charging through the head, particularly when starting up a new system with SO₂, there is an oil blanket to be considered in the receiver. As the receiver valve is opened and the liquid takes its course through the system, the liquid will leave the receiver much faster than it can be charged to the receiver. This then allows the oil blanket to be lowered until eventually the liquid leaving the receiver has a very large percentage of oil which finds its way into one or more boilers, thereby lowering the efficiency of the boiler, very much in some cases, but at least for a time until the oil is boiled out or trapped at some location. After a sys-

garding the discharging of the system into drums, it is advisable to disconnect the upper 1/4-inch nut of valve (B), as shown in diagram, and cap that outlet. Then, when the drum is connected to the branch outlet, it is in the position of discharging or recharging the system. When discharging a system servicemen often use a pinch-off tool on the liquid line and hook empty drum to receiver outlet. Now when discharging with the two valves installed, the use of the pinch-off tool is eliminated and this is an asset.

WE BUY New and Used ELECTRIC REFRIGERATORS In Any Condition

Phone, Write or Wire All Details, Type of Motor, Size of Box, Etc.
KASKEY & QUINN, Inc.
525 Arch Street Philadelphia, Pa.

FLINTLOCK CONDENSERS Full Capacity



With Every Unit

FIN AND TUBE SAME SOLID PIECE OF MATERIAL

FLINTLOCK CORPORATION

4461 W. Jefferson Ave. DETROIT, MICH.

Precision Built VALVE Needles VALVE Seats VALVE Mechanisms

Four years of satisfactory service to the industry

Buerk Tool Works
42 Pearl St. Buffalo, N. Y.

PATENTS

Secured for inventions relating to Refrigeration, Electrical Apparatus and Treatment and Handling of Foods and other important subjects.

MASON, FENWICK & LAWRENCE
Patent and Trade-Mark Lawyers
Established 1861 Washington, D. C.

TRADE MARKS

PROMOTING A PARADOX

Heating by Refrigerating Cycle

By Carl F. Mowrey
Syracuse Lighting Co., Inc., Syracuse, N. Y.

IT is well known in engineering circles that the heat dissipated by the condenser of a refrigerating system is greatly in excess of the heat equivalent of the electric current consumed by the motor. It follows consequently, that the practicability of heating buildings by the use of refrigerating machines has been frequently discussed, but up to the present time there is nothing on the market for this purpose.

It is the purpose of this paper to show that the time of heating by the refrigeration cycle is steadily approaching, and that it is apparently well worth while for those who would benefit the most to take an active interest in the development of a system or systems for practical use.

Considering that this paper will be read by some persons not familiar with refrigeration technicalities, an endeavor is being made to write it in such a manner that it will be clear to all.

Heat and Temperature

We will start with heat and work up to heating. Many scientific phenomena tend to prove that at a temperature of -460° Fahrenheit, no heat exists. Practical experience in the refrigeration field shows that in our computations we may consider this to be so, and as a result arrive at correct mathematical results pertaining to the operation of refrigerating systems under different sets of conditions. In order to make the explanation clearer, we will compare the heating system with a water system. Assume a man has his house part way up a hill so that there is a drop of about 500 feet to level ground below him and that there is a natural reservoir 70 feet above his ground level. Now suppose he runs a pipe from the reservoir to a pump on his ground level, and from the pump to a pond, the surface of which is at his ground level. Suppose still further that he runs another pipe line from the upper reservoir down the side of the hill and at a point 460 feet below his ground level, and connects the pipe to a water turbine. It is obvious that if he started pumping water from the pond to the reservoir and allowed the overflow to flow down through the turbine, that the power generated by the turbine would be greatly in excess of the power required to lift the water to the reservoir. It is clear that, theoretically, the ratio of

power supplied to the pump to that generated by the turbine is as 70 is to $(460 + 70)$ and that the ratio of the power supplied by the pump to that generated by the water dropping from the ground level to the turbine is as 70 is to 460. Call the height of the reservoir H_2 and the ground level at the house H_1 . Then the ratio of the power output (from the ground level to the turbine) to the power input = $\frac{460}{70} = \frac{H_2 - H_1}{H_1}$.

Now assume that this man wanted to heat his house by electricity to a temperature of 70° when the outside temperature was 0° . It is a well known

fact that heat and energy are interchangeable and that neither can be created or destroyed but can easily be changed from one form to another. One kilowatt hour of electricity equals .746 horsepower or 3,414 B. T. U. (British thermal units or heat units). If ordinary electric heaters were used to heat the house, of course, 3,414 B. T. U. would be delivered in the house for every kilowatt hour consumed. If, on the other hand, this power was used to run some type of machine for raising heat from 0° to 70° , the amount of heat delivered at 70° would be greatly in excess of the heat equivalent of the electricity consumed by the motor. This is true in case of a refrigerating system used for heating and, theoretically, the ratio of the heat delivered to the heat equivalent

of the current consumed is as $\frac{460 + 70}{70}$. The heat delivered at 70° is the sum of the heat extracted from the air at 0° plus the heat equivalent of the current supplied the motor. The ratio of the heat extracted at 0° to the heat equivalent of the current supplied is as $\frac{460}{70}$ and if we call the higher temperature $(70^{\circ}) T_2$ and the lower temperature $(0^{\circ}) T_1$, then this ratio = $\frac{T_2 - T_1}{T_1}$. This ratio in refrigerating circles is called the coefficient of performance or C. P.

It is obvious that $\frac{T_2 - T_1}{T_1}$ and $\frac{H_2 - H_1}{H_1}$ are the same, except one deals with heat and the other with power. There is one great difference, however, for after the water has reached its high level, it must flow down to the turbine to supply the power, but in the case of heat for heating only it doesn't have to drop to a temperature of 460° in order to give a certain C. P. The reason is, of course, because nothing is taken from the heat at the upper temperature. It is only a medium in which people feel comfortable at that temperature and it makes no difference what happens to it after it is dissipated from a house.

Air-Cooled System

We will consider the operation of a simple air-cooled refrigerating system. It is composed of an electrically-driven compressor to which are connected two sets of coils with a pressure-reducing valve between. The refrigerant (of which there are many kinds) is compressed into one set of coils, which we will call the high side. The work done by compression, and the fact that the

gas is compressed into a small space, cause the temperature to rise. Air circulating around the high side takes away so much of this heat that the gas condenses to a liquid. The liquid then goes through the pressure-reducing valve into the coils (called the low side) which are usually in a refrigerator. Although it is comparatively cold in the refrigerator, the refrigerant has lost so much of its original heat that when it expands back to its original volume it is colder than the air in the refrigerator; therefore, heat flows from the air in the refrigerator to the refrigerant, making the refrigerator colder. The gas is then pumped through the compressor again, and so on.

High Side As Radiators

We will assume that a house-heating plant is laid out somewhat as follows: The motor and compressor are located in the basement or garage. The high side coils are arranged so as to take the place of radiators in the various rooms. The low side coils are placed under a porch where the wind can blow on them. A thermostat is set so that it will start the motor when the room temperature drops below 70° and stop it when it goes slightly above. Enough high side coil is supplied so that their temperature will not rise above about 100° . Heat is thus taken from outdoors and raised to a temperature sufficiently high that it will be picked up by air currents and thus heat the house. The heat equivalent of the current consumed by the motor is also radiated into the house and garage or basement.

Consider that this plant is installed in an ordinary uninsulated seven-room house in Syracuse, New York. It would require ten to twelve tons of coal a year to heat such a house. In February, the coldest month, it would require about one ton in fifteen days, or about 133 lbs. a day. The efficiency of an ordinary hot air furnace is about 50 to 70%. Assume 60% and the heat value of the coal as 12,000 B. T. U. per lb. In that case, the average daily heat requirement for February would be $133 \times 12,000 \times .6 = 960,000$ B. T. U., or an hourly load of 40,000 B. T. U.

If the temperature at which the refrigerant finally condenses in the high side coils is 95° , the average temperature of the coils will be at least 100° , which temperature is high enough above the room temperature to allow for the heat transfer with modern radiator attachments. Assuming that the outdoor temperature is 22° (the Syracuse average for February), a 5° temperature in the low side coils is low enough to pick up the heat. Then $T_2 = 95^{\circ}$

and $T_1 = 5^{\circ}$, therefore, C. P. = $\frac{T_2 - T_1}{T_1} = \frac{460 + 5}{465} = 5.16$.

Of course, there are losses of various kinds, and as a result the actual C. P. is about 50% or better of the theoretical C. P. Assume C. P. equals 2.6. Therefore, the heat taken from the air is 2.6 times the heat equivalent of the current consumed by the motor. The total heat delivered to the house is the heat taken from the air plus the heat equivalent at the motor, or 3.6 times the heat equivalent of the current consumed by the motor, which means that it would take 3.6 times as much current to supply the same amount of heat through the medium of electric heaters.

It is obvious from the formal $\frac{T_2 - T_1}{T_1}$ that the closer T_1 and T_2 can be brought together, the greater the amount of heat that can be delivered for a given amount of current consumption and conversely. When C. P. = 2.6 electric current at $1\frac{1}{4}$ c per kilowatt hour would just about be equal to hard coal at prevailing retail prices as far as heating values are concerned. In the spring and fall the C. P. would, of course, have a higher average, thus decreasing the relative cost of the heat.

Outdoor Temperature Variations

The C. P. for the case above would not be constant but would be higher on days above average temperature and lower on days below average temperature. Lower outdoor temperature not only lowers the C. P. but lessens the capacity of a compressor considerably. Therefore, it would be advisable to have two compressors in series, the first stage compressor supplying heat to the second stage compressor through coils in a heat exchanger when the outdoor temperature dropped below a certain point. Let us see about what horsepower would be required to operate the above-mentioned plant under average condi-

tions. The heat equivalent of one horsepower = 2,545 B. T. U. Therefore, the load under the above conditions would be $\frac{960,000}{2,545} = 377$ H. P. Extreme conditions would necessitate about twice as much power.

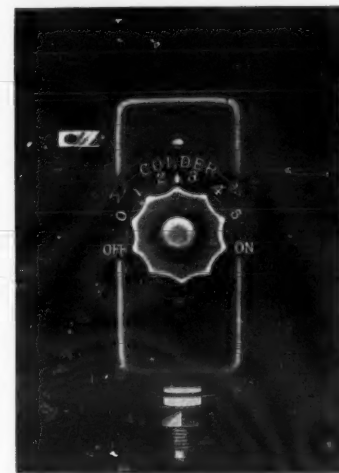
If a house were insulated, the heating requirements could be reduced by about one-third, or in the above case, to about 2.9 horsepower for average conditions, and 6 horsepower for extreme conditions.

Considering the relatively high C. P. in spring and fall, if a person with a well-insulated house and a minimum amount of basement could buy electricity at three cents a kilowatt hour for his heating plant, it would not cost much more to heat by electricity than by coal in the old-type house.

COPELAND BUSINESS GOOD IN NEW YORK

New York, N. Y.—K. S. Baxter, manager of the New York branch of the Copeland Sales Company, reports that Copeland apartment house installations here to date show almost a 100 per cent increase over the same period last year, and that the September, 1930, business was more than 100 per cent over that of the identical month of 1929.

Complete figures given out by Baxter revealed that for this particular class of work, Copeland, during their first eleven months of their fiscal year, enjoyed an increase of 95 per cent over the corresponding period last year, while September, compared with the same month of last year, shows an increase in business of 138 per cent.



Six Plus Values of PENN Type 'J' Unit Control

THERE are six "Plus Values" found in the new Penn Type J Unit Control, which set it apart from all other controls. It combines the functions of several switches into one compact instrument that provides:

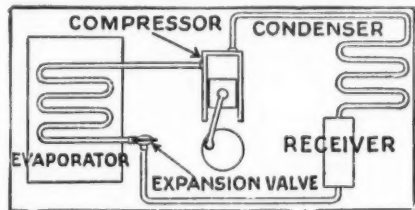
1. One Dial Control.
2. Temperature Selector.
3. Range and Differential Adjuster.
4. Start and Stop for Defrosting.
5. Thermal Overload Protector.
6. Simplicity—Low Installation Cost.

To further simplify your own domestic refrigerator, and give it a control of the same high standards as your machine, write at once for complete information about Penn Type J.

PENN ELECTRIC SWITCH CO.
DES MOINES, IOWA

Penn Type J is now used as standard equipment by some of the largest and best known manufacturers of electric refrigerators in the industry.

New, Easy, Practical Home Training in Electric Refrigeration



ENDORSED BY LEADING MANUFACTURERS

Here at last is a practical, easy method of training that will help you master the money-making principles of electric refrigeration—right in your own home, in your spare time! The Utilities Engineering Institute now offers you an opportunity to realize your ambitions in a short time by a wonderful home training system endorsed by the industry's leaders everywhere.

HERE'S PROOF

"Your Institute should be of great interest to men wishing to get into the service and sales end of this great business. It will be a pleasure to cooperate with you."—Col. F. E. Smith, Pres., SERVEL, Inc.

"Your course should be of great help to those working in the refrigerating industry. We have recommended it to our employees."—CHAMPION Electric Company.

"There seems to be a definite need for trained men and we believe every manufacturer, including ourselves, should find use for men with a well grounded knowledge of the principles. We believe the industry is being benefited by the wonderful work you are doing."—Sales Promotion Division, General Electric Co.

No Textbooks—Simple as A. B. C.

This training is unlike ordinary schooling. No textbooks—no involved theory. You learn quickly from easy lessons prepared by trained experts. Entirely practical throughout. Charts, diagrams, pictures help you grasp every fundamental. Hundreds of satisfied students everywhere.

Get This FREE Book!

"Rich Rewards In Electric Refrigeration" contains full facts about this marvelous new training. Get it free today without obligation—simply fill in and mail coupon below. But act NOW! Utilities Engineering Institute, Dept. 9100, 4403 Sheridan Road, Chicago, Illinois.



Utilities Engineering Institute

4403 Sheridan Rd., Dept. 9100, Chicago, Ill.
Send me at once without cost or obligation your new book and full facts about your easy, practical home training in Electric Refrigeration.

Name
Address
City State
Position

precision built

Specializing in
Refrigeration Compressor
Eccentric
and
Crank Shafts

Made to your specifications. Send us your blue prints—we'll send you our prices.

Modern Machine Works, Inc.

195 Milwaukee St., Dept. C, MILWAUKEE, WIS.

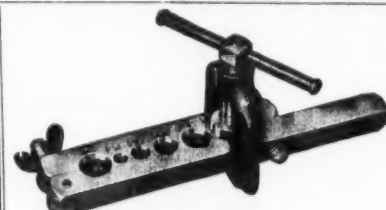
Imperial

Aids To Better Installations



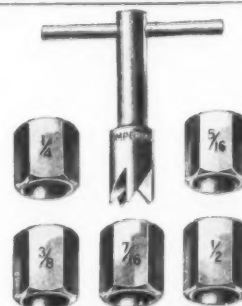
Imperial Tube Cutter

Here is a highly efficient tool for cutting copper, brass, block tin and lead tubing. It takes all sizes of tubing from $\frac{1}{8}$ " to $\frac{3}{4}$ " and makes a right-angle cut, quickly and cleanly, leaving no burrs or chips to clog the line. The tubing does not become out of round as when put in a vise. When this tool is used tubing can be cut in half the time required by old methods and a far better job results. No. 94-F Tube Cutter, each \$2.50



Imperial Flaring Tool

Gives the proper flare and taper to the tubing for making up joints. A perfect flare means a tight joint and this tool does the work in least time and with utmost simplicity. No loose dies—no vise necessary. No. 92-F takes tubing sizes $\frac{7}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ ". Each \$3.00
No. 95-F takes tubing sizes $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ ". Each \$4.00



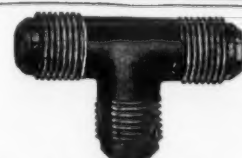
Imperial Refacing Tool

This new tool insures against leaks caused by S. A. E. couplings that do not seat properly. In use, the coupling is inserted into the correct adapter, then a few turns of the five-fluted hardened steel refacer produces a faultless seat of correct size and taper for a tight and leak-proof joint. No. 100-F Refacing Tool with adapters for sizes $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ ". For Set \$3.75



Imperial Tube Bender

Just slip this tool over the tubing where the bend is to be made. Then bend both tube and coil by hand to whatever form desired. Seven Tube Benders comprise a complete set. No. 101-F Tube Bender Set for tubing sizes $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ ". For Set \$2.75



Imperial Brass Forgings

Accurately made to meet all the requirements of Reless Refrigerator Manufacturers. Will not leak. Let us quote on your requirements.

Send for New Catalog

The Imperial Catalog, just off the press, illustrates and describes the complete Imperial line of Brass Forgings, Valves, Manifolds, Tools, etc. To become acquainted with the newest and most modern, send for this catalog today. It's free.

THE IMPERIAL BRASS MANUFACTURING CO.
565 SOUTH RACINE AVE. CHICAGO, ILL.

FRIGIDAIRE, G. M. RADIO FORM SALES ALLIANCE

(Concluded from Page 1, Column 4)

ganizations has already started, and although the movement will require some time to complete, it is expected to result in a working arrangement that will be satisfactory from the dealer standpoint.

The statement issued by Mr. Biechler and Mr. Emmert follows:

"Frigidaire Corporation and General Motors Radio Corporation have formed an alliance which makes it possible in many instances for the General Motors radio and electric refrigerator to be sold by the same dealer.

"This does not mean that all General Motors radio dealers will at this time have an opportunity to sell Frigidaire, nor does it mean that all Frigidaire dealers will be permitted to sell General Motors radio. The plan, however, does contemplate the same dealers receiving franchises for both commodities where such an arrangement can be made, consistent with the policies of both organizations.

"This is a subject that has been raised many times during the past two or three months by dealers in both organizations and we are confident that these men, who have been interested in an addition to their present line of products, will be very much pleased with the progress that has been made."

REQUESTS FOR INFORMATION

Readers who can be of assistance in furnishing correct answers to inquiries, or who can supply additional information, are invited to address Electric Refrigeration News, mentioning query number.

Ice Cube Trays

Query No. 388.—"Will you please advise us of a manufacturer who makes ice cube trays of various sizes for electric refrigerators?"

Note.—American Radiator Co., Industrial Division, 816 S. Michigan Ave., Chicago; Fedders Mfg. Co., 57 Tonawanda St., Buffalo, N. Y.; and Kulair Corp., 1609 Finance Bldg., Philadelphia, Pa.

RADIO PIONEERS TAKE COPELAND

Denver, Colo.—The Rocky Mountain Radio Corp., of this city, exclusive distributor of Lyric radio for the states of Colorado, New Mexico and Wyoming, is also the Copeland distributor for the same states.

Paul B. Lanus, president of the wholesale firm, is one of Denver's pioneers in radio merchandising, and from the very beginning in 1922, when it was very young, has been an exclusive radio wholesaler. During the first few years in the radio business the Rocky Mountain Radio Corp. shipped many sets to South America, South Africa, Mexico and a great quantity of radio telephone sets to Japan.

Mr. Lanus reports: "Many dealers, particularly in the radio field, are evidencing an interest in electric refrigeration. To date we have in the city of Denver thirty-one Copeland apartment house installations under our jurisdiction. And with a small experienced service department we are able to keep all our Copeland installations in operation satisfactory to the owners."

STARR-FREEZE ENTERS BALTIMORE FIELD

Baltimore, Md.—Considerable interest in electric refrigeration was created in Baltimore, when Hecht Bros., large operators of department and furniture stores, offered \$50,000 worth of Starr-Freeze electric refrigerators at low prices. They were offered at prices ranging from \$144 for models having four and one-quarter cubic feet capacity, to \$295 for the de luxe model with porcelain interior having eight cubic feet capacity. The large double-door model, having seven cubic feet capacity, was offered for \$169. This model had chromium-plated hardware, white lacquered finish on interior as well as exterior. The box was of wood.

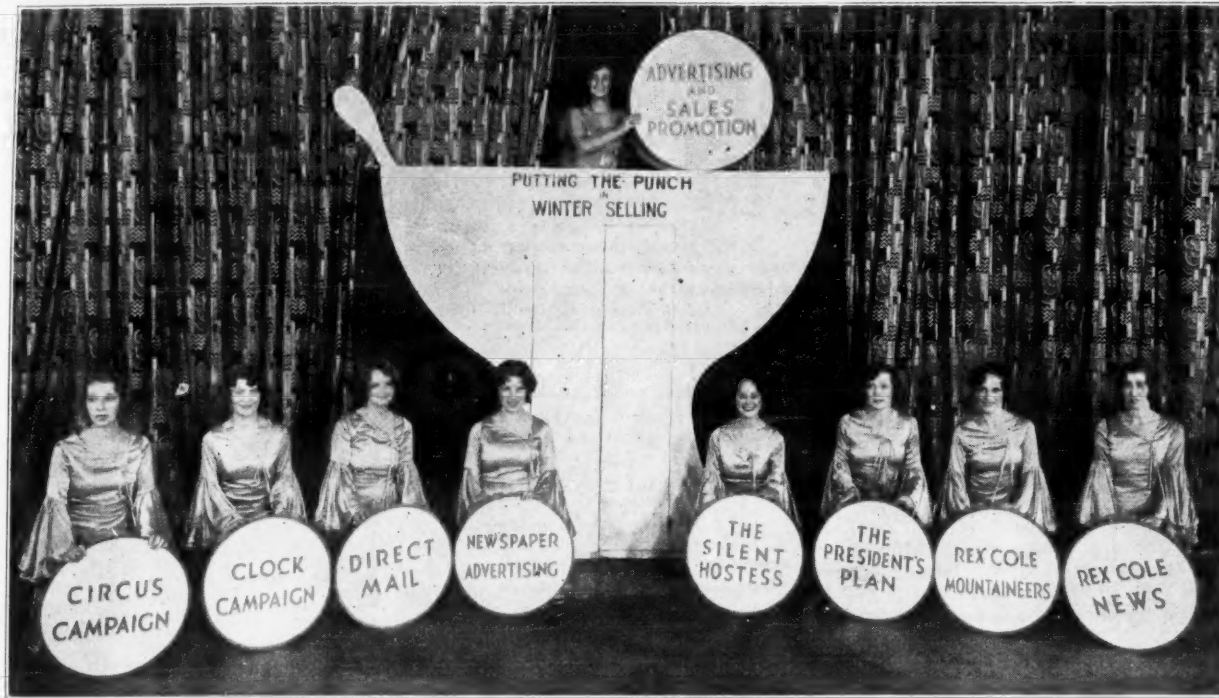
MICHIGAN MAJESTIC MEN TO MEET

Detroit, Mich.—Dealers operating under the Detroit Majestic Products Corp. are planning to attend a luncheon and meeting at the Book-Cadillac Hotel, Oct. 22. The distributor will be host on this occasion, and selling plans for the new Majestic refrigerator will be taken up.

SMITH JOINS WAYNE IN SEATTLE

Seattle, Wash.—William Smith has joined the sales staff of the Washington Home Equipment Company on Fourth Ave., distributors in this section for Wayne electric refrigerators and oil burners.

Rex Cole Concocts Winter Punch



Members of Rex Cole Sales Promotional Department Do Their Bit

TWO BUILDING PROJECTS HAVE PROVISIONS FOR REFRIGERATION

Baltimore, Md.—A refrigeration plant will be installed in the Crownsville (Md.) State Hospital sometime in the near future, according to present plans. Joseph Evans Sperry, with offices in the Calvert Building, is the architect for the work, and plans are now being drawn up.

Refrigerating equipment will be installed into the new proposed Baltimore Athletic Club building to be erected at 219 North Calvert Street, Baltimore, Md. The estimated cost of the club building, which will be about eight stories, is around one million dollars. Fred A. Fletcher, 13 West Franklin Street, is the architect for the work, and plans for the refrigeration installation and other mechanical equipment are now being drawn.

SAN ANTONIO MEN HEAR ABOUT CIRCUS CONTEST

San Antonio, Tex.—More than 100 General Electric dealers from southwest Texas were in attendance at an all-day semi-annual conference of Wright Brothers of San Antonio, Texas, recently, at which time new sales plans and policies were outlined, and the circus contest announced and explained.

A banquet in the evening closed the meeting. S. J. Ballinger, publicity director of the San Antonio Public Service Company, served as toastmaster. Talks were given by Wm. M. McIntosh, publisher of the San Antonio Light; Mark Wright, of Wright Brothers; J. E. Vaughan, of El Paso; and J. H. Roberts, retail sales manager of the G-E department of Wright Brothers.

EASTERN COMPANY FILES BANKRUPTCY PETITION

Springfield, Mass.—The Springfield-Kelvinator Sales, Inc., has filed a voluntary petition in bankruptcy. The concern lists liabilities amounting to \$37,726 and assets of only \$7,088. The voluntary bankruptcy proceedings followed a favorable vote by the stockholders. Howard S. Neff, Ware, Mass., is president of the company, and Philip M. Johnson, vice-president.

COOPER AND JAMES GET LARGER TERRITORIES

Springfield, Ill.—The Bulpitt Refrigeration Co., 410 South Fifth Street, distributors for the General Electric refrigerator, has been taken over by R. Cooper, Jr., Inc., 120 South LaSalle Street, Chicago, and James & Co., Planters Bldg., St. Louis. The Bulpitt Refrigeration Co. has been operating in 47 counties in the state since the first of 1929. The deal took effect October 1.

OFF-SEASON MERCHANDISE

Hatfield, Mass.—The Heat Control Corporation is offering the Thermo-King heat regulator as off-season merchandise for electric refrigeration dealers and distributors. This device can be attached to the heating plant in the home, so that a desired temperature can be kept day and night, regardless of weather changes.

The Thermo-King provides for all intermediate damper positions and operates on the same principle used in electric refrigeration. Changes in pressure in the regulating device cause the damper to be opened or closed. It is completely automatic and self-contained.

The Expansion Valve

By GEORGE F. TAUBENECK

T. K. "Ted" Quinn, the master strategist of General Electric and the refrigeration industry, amused the Detroit A. S. R. E. not long ago with a little tale on himself.

The story is entertaining in itself, which is sufficient cause for its appearance in this kolum; but more than that, it presents a talking picture of that "keep everlastingly on the job" spirit which is so typical of the head man of General Electric's refrigeration division.

"I was best man at a wedding not long ago," relates Mr. Quinn. "There was a big crowd there—a throng of interested, attentive, good-humored individuals.

"Came a pause in the ceremony. The minister lost his place in the ritual, or something of the sort, and there was a long, expectant hush. It was all I could do to hold my position. What a great opportunity to step over to the center of the stage and announce:

"Ladies and gentlemen, I'd like to take advantage of this temporary intermission in the ceremony to say a few words about the General Electric refrigerator,' etc., etc."

Mr. Quinn embellishes his public speeches with a carload of good old Irish smiles, which he squanders wantonly and indiscriminately upon his audience. Between phrases he pauses long enough to let the preceding thought sink in and arouse curiosity concerning the next one.

Yet he wastes not a second of his speech, for during each of these effective pauses he is capturing his hearers with those magnificent smiles.

In case you've never seen him, he is rather slight and wiry of build, has thick, wavy, sandy hair, and a pair of piercing, darting eyes. Quick, nervous movements, and a general air of alertness, complete the picture.

That gathering of the lions at the last Detroit A. S. R. E. meeting afforded the onlooker a number of intimate glimpses of distinctive personalities.

There was "Salesman Sam" Vining, Servel's sales manager, for instance. Big, rough-hewn, aggressive, he is a first-class representative of the "football coach" type of sales manager.

He thinks straight, ferrets out flaws and weaknesses like a Philco Vance, and when he has his facts assembled he shoots them from the shoulder without hesitancy or apologies.

Another exponent of the hard-hitting school of salesmanship is Bill Grunow, of Majestic, concerning whom there was considerable palaver in this kolum last time.

At the recent Majestic distributors' meeting in Chicago Grunow was in rare form. Big as a house and abrupt as a top sergeant, his speeches left an impression on that group that ought to last until the horse and buggy regain their lost favor.

"I feel toward this refrigerator as a mother does toward her child," asserted Grunow. "We had to go through a lot to get it, and we'll work for it and plan

for it and fight for it as if it were our own flesh and blood."

One scene from the Majestic distributors' conclave sticks to the memory like T-bone steak is supposed to adhere to the ribs. It was this:

All the distributors are piled into four big motorbuses, zooming down Chicago's busy streets. An escort of motorcycle policemen is clearing the path with screeching sirens and furious, careening rushes.

Ahead of the cavalcade in a chauffeured 16-cylinder Cadillac coupe, rides Bill Grunow, the pacemaker for his following.

Another recent distributors' meeting, the banquet of Kelvinator men, held in the Statler Hotel, Detroit, presented an hilarious image of the spirit of prosperity.

Kelvinator business has been good this year, and these men were celebrating the fact. It was one of the most rousing gatherings the Statler ballroom has witnessed in many moons, according to the gentlemanly, white-haired major-domo of the place.

A booming voice and a commanding presence, hitched to a sense of time and a feeling for those so-called "psychological moments," made Vice President H. I. Burritt a toastmaster par excellence.

He kept the affair moving at a double-quick tempo, so that nobody realized the passage of the hours until it was all over. A jazz band which worked overtime, horns, whistles, paper caps, a chorus of "swell-looking dolls," an imported night club hostess, clowning acrobats, fancy skaters, a baritone singer who looked like the village blacksmith and sang tender love songs with terrorizing frowns and menacing gestures (he responded to applause by shaking his own hands over his head like a prize fighter), and an unspoiled boy prodigy who played an accordion like nobody's business made the program as lively as a litter of pups.

The best trick of the evening was demonstrated when Toastmaster Burritt was able to divert the minds of the crowd from the entertainment and festivities to more serious channels.

In the docket were two speakers with real meat to offer—Howard Lewis, Kelvinator treasurer, and Merle Thorpe, editor of *Nation's Business*.

The proverbial twinkling of an eye was all Mr. Burritt required to calm the wild waves. And in a trice the huge assemblage was listening enthralled to Mr. Lewis' brilliant and penetrating analysis of the business situation surrounding the refrigeration industry.

European firm with best connections in the refrigerating field, which heretofore has been handling the products of a world-known manufacturer, SEEKS NEW CONNECTIONS with manufacturers of small refrigerating units who are in the position to guarantee, not only to promise, the quality of their products. Please send literature and price list f.o.b. New York, for domestic as well as commercial line to L. V. 6141 RUDOLF MOSSE, LEIPZIG, GERMANY.

THE CONDENSER

ADVERTISING RATE fifty cents per line (this column only).

SPECIAL RATE if paid in advance—Positions Wanted—fifty words or less, one insertion \$2.00, additional words four cents each. Three insertions \$5.00, additional words ten cents each. All other classifications—fifty words or less, one insertion \$3.00, additional words six cents each. Three insertions \$8.00, additional words sixteen cents each.

POSITIONS WANTED

EXPERIENCED service man available. Thoroughly familiar through long experience with Frigidaire and Kelvinator installation and service. Formerly employed by Kelvinator-Nizer and several ice cream manufacturers. Best of references as to ability and character. Wish to obtain service or general repair work. Address Box 285.

KELVINATOR commercial and domestic service and installation man wishes to relocate with suitable firm. Three years experience with Kelvinator people. Address Box 289.

POSITION wanted. Executive refrigeration engineer desires permanent connection with manufacturer. Age 36. Member A. S. R. E., college graduate, 12 years experience sales, engineering and promotion; domestic and commercial. Five years extensive traveling U. S. and Canada. Moderate salary to start. Box 287.

AVAILABLE an experienced installation and service man, in both commercial and domestic machines, either methyl chloride or SO₂. I am capable of handling the work for a distributor or at a factory. I am a young married man, with several years' experience, will furnish references upon request. Box 286.

MISCELLANEOUS

WANTED—Servel units for cash No. 1, No. 8, No. 15, No. 21, No. 22-A. Boxes and tanks not wanted. State price and full details. Box 288.

CASH: For discontinued stock of low pressure automatic refrigerating compressors and coils. Submit full description, prices, etc., to Box 290.

Attention Service Managers

When you need mechanics, installers and service men—men practically trained in Electric Refrigeration work—call on us. We can furnish qualified graduates to meet your specifications. No charge to you or to them. Write, wire or phone.

THE NATIONAL TECH

Where men learn by doing—not by correspondence 902 Ulmer Bldg., Cleveland, Ohio

AMERICAN EXPANSION VALVES AUTOMATIC-THERMOSTATIC AMERICAN RADIATOR COMPANY

Filtrine

Guaranteed FILTERS for Electric Water Coolers. Pure, Clear Water.

FILTRINE MANUFACTURING COMPANY 49 LEXINGTON AVE., Brooklyn, N.Y. Manufacturers of FILTERS & COOLERS of all sizes

Testing Service

for Domestic and Commercial Electrical Refrigeration

Testing and experimental laboratory service for Manufacturer, Distributor, Central Station. Test data exclusive property of client.

Electrical Testing Laboratories 84th St. & East End Ave. NEW YORK

They Will Not Melt Realistic Food Products

A complete assortment especially designed for refrigeration display.

27 ARTICLES FOR \$20.00

Realistic Food Products Co. 266 Fabian Place NEWARK, N. J. Special Representative: G. R. PIZZARO, Los Angeles, Cal.

Refrigerated Food Section

ELECTRIC REFRIGERATION NEWS

In Three Parts—Part 2

The business newspaper of the refrigeration industry

ISSUED EVERY TWO WEEKS OF THE
VOL. 5, No. 4, SERIAL No. 106

DETROIT, MICHIGAN, OCTOBER 22, 1930

Entered as second class matter
Aug. 1, 1927, at Detroit, Mich.

FIFTEEN CENTS PER COPY
TWO DOLLARS PER YEAR

GEORGIANS

Taste and Test Frozen Fruit at Experiment Station

Experiment, Ga.—During the early part of 1930, the program of the Georgia State Experiment Station's work in the freezing of fruits and vegetables was greatly enlarged. This was necessitated by the increased interest brought about by the establishment, in the state, of two plants for freezing fruits on a commercial scale. These two plants, as well as several other agencies and individuals, felt the need of further research in the freezing of fruits, and consequently joined in with the Experiment Station in a general research project designed to answer such questions as might be vital to fruit freezing industry.

At the close of the fruit harvest season it was thought best for all the co-operators, who could, to meet at the Experiment Station, examine the varied assortment of products which had been preserved by freezing, and review the accomplishments of the year, as well as lay plans for further co-operative experimental work. Such a meeting was thus called for at the Experiment Station, October 10, 1930.

The co-operators and visitors, including experts from such distant points as New York and Chicago, were assembled in the library and welcomed by Director H. P. Stuckey who said that the Georgia Experiment Station was supported by the taxpayers and felt very keenly its responsibility in doing its part to make the fruit freezing work of the state a commercial success. He stated that the representatives of the institution had informed themselves as to what others had done, and had been greatly aided by chemists, refrigeration engineers, and other technical persons who had worked in such close co-operation with the institution in carrying out its particular part of the general co-operative undertaking. He announced that immediately following the examination and study of the exhibits of frozen products the visitors would be served a light luncheon from products that had been frozen.

After an extended examination of the exhibit of frozen products, more than 300 samples being opened, and the consumption of the luncheon prepared from frozen products, the co-operators reassembled in the by-products laboratory for a general discussion. J. G. Woodroof, of the Experiment Station, presided. He said in part:

"We believe that the freezing of fruits and vegetables in Georgia will succeed or fail for the same reason that canning industries have succeeded and drying plants have failed. We believe that the key to the future lies in accumulating facts. The three broad fields from which the facts must come are from the fields of chemistry, biology and refrigeration engineering.

"The trial and error method of finding our way does have a place, so does 'luck'; but in the long run we will follow the natural laws of chemistry, biology and refrigeration engineering.

(Concluded on Page 7, Column 2)

NEW ORLEANS

All Set for Nordic Campaign

New Orleans, La.—A frozen food luncheon similar to the one staged September 17 in Syracuse, N. Y., (reported in the Sept. 24th issue of the Refrigerated Food Section) will be held here in the Hotel Roosevelt, Thursday, October 23, under the auspices of the Young Men's Business Club, an organization of younger members of the New Orleans Chamber of Commerce.

An announcement to this effect was made on October 20 by George C. Rohrs, general sales manager of the Atlantic Coast Fish Corporation, of New York, who arrived here Sunday to take personal charge of the merchandising campaign in this city on behalf of his company's new product, quick chilled Nordic fish steaks.

More than 1,200 invitations will be issued for the luncheon, and, unlike the Syracuse affair, each man invited will be asked to bring a lady guest. The chief speaker will be Dr. Harden F. Taylor, former chief technologist of the United States Bureau of Fisheries, and inventor of the "Taylor Process" for quick chilling foods.

Mr. Rohrs brought with him encouraging reports concerning the sales re-

(Concluded on Page 2, Column 1)

Juicy Jumbo



Boston, Mass.—To the Kelvinator sales branch here fell the big task of keeping "Jumbo," the 160 $\frac{3}{4}$ -pound watermelon, in an eatable condition until the American Legion held its annual convention at Boston. The mammoth melon was shipped to the branch thirty days previous to the big affair which crowded the streets of Boston during the early part of October. It was the property of the Leslie Huddleston Post No. 12, Hope,

Ark., who startled the easterners with the products the folks grow back in Arkansas.

Previous to the convention, "Jumbo" attracted much attention reposing in the cool atmosphere of a Kelvinator set up in the display window at 749 Boylston St. During the convention it was the biggest attraction in the Arkansas state exhibit.

The world's largest watermelons are

grown in the country adjacent to Hope, Arkansas, and yearly, at the time the larger melons are ripe, a watermelon festival is held, together with contests for the largest and best melon. "Jumbo" was very close to the largest, if not the largest, that has ever been raised, and when it was cut at the end of the Legion convention, furnished quite a watermelon feast for a considerable number of people.

Low Temperature Refrigeration

Detroit, Mich.—Another big meeting has been planned by the enterprising Detroit Section of the American Society of Refrigerating Engineers. Because it is one of the most actively discussed subjects of the day, Low Temperature has been selected as the general subject of the meeting, and a notable group of the leaders in low temperature work has been invited to speak.

F. M. Cockrell, publisher of ELECTRIC REFRIGERATION NEWS, will preside. Efforts are being made to have every side of low temperature activity represented and the program printed below has been prepared.

The meeting will be held at Webster Hall, Cass Avenue and Putnam Street, Detroit, at 6:30 P.M. on November 3rd. The dinner will cost \$1.50 and reservations should be sent as early as possible to Detroit Section, A. S. R. E., 478 West Alexandrine, Detroit.

"Selecting the Refrigerant for Low Temperature Applications."

H. D. Edwards, President, American Society of Refrigerating Engineers.

"Equipment Requirements of the Retail Store."

Gardner Poole, General Seafoods Corporation, Gloucester, Mass.

"Construction Problems Confronting the Manufacturer of Display Cases."

D. E. Rutishauser, Hussman Ligioner Co., St. Louis, Mo.

G. J. Hopkins, McCray Refrigerator Corp., Kendallville, Ind.

J. W. Hill, Campbell Hill, Inc., Milwaukee, Wis.

"Opportunities for Industry Co-operation."

Dr. Harden F. Taylor, Atlantic Coast Fisheries, New York, N. Y.

"Application Problems of the Manufacturer of Cooling Units."

R. W. Sinks, Frigidaire Corporation, Dayton, Ohio.

John Wyllie, Jr., Kelvinator Corporation, Detroit, Mich.

"The Packer's Viewpoint."

H. W. McKee, Swift & Co., Chicago, Ill.

H. J. Koenig, Armour & Co., Chicago, Ill.

P. L. Robertson, Cudahy & Co., South Omaha, Neb.

A. McKenzie, Wilson & Co., Chicago, Ill.

"The Market for Frozen Fruit."

A. J. Rogers, Traverse City, Mich.

"Profit Possibilities for the Local Distributor."

George Nitterhouse, Indianapolis, Ind.

"Quick-Frozen Food and the Canning Industry."

W. E. Vaughn, American Can Co., Chicago, Ill.

ADVOCATES

Of Packaged Meats Present Strong Case to Packers

Chicago, Ill.—Packaged meats, both quick-frozen and fresh cut, had their innings before the morning session of the annual convention of the Institute of American Meat Packers at the Drake Hotel on Tuesday, October 21st. If any of the stand-pat element among the packers expected a flagging of the enthusiasm for the new methods of distribution on the part of those actually engaged in it, they were disappointed. Marion Harper of the General Foods Corporation, advocating quick-frozen meats, and Samuel Slotkin of Hygrade fame, and Frank Parsloe of the Boback organization, both devotees of fresh cut meats, all emphatically reaffirmed their faith in the future of packaged meats. All three stated their case with an earnestness that left their hearers in no doubt as to exactly where they stood. Mr. Harper fortifying his side of the argument with convincing sales figures from the Springfield, Mass., experimental campaign.

Several of the speakers who had gone before, notably Col. H. C. Sherrill, former city manager of Cincinnati, and now vice-president of the great Kroger chain, had referred to packaged meats as still in the experimental stage, but at the same time talked sanitation so strongly that the packaged products practically suggested themselves.

Mr. Harper was the first of the three apostles of the new era to be called upon by the chairman, Chester G. Newcomb. He prefaced the statistical part of his talk, by explaining why Springfield was selected as the proving ground for the Birdseye Frosted Foods, and then made clear some of the obstacles that had to be overcome.

Springfield, according to Mr. Harper, was chosen for simple reasons. In the first place it is near Boston, where the Birdseye meats are frozen. It is a city of moderate size, about 100,000 inhabitants—30,000 families. These families could be reached by display newspaper advertising at a reasonable cost. Finally Springfield is in New England and that means thrift.

The two main objects of the campaign were, first, to test the public acceptance of the quick-frozen foods; and, second, to pioneer the equipment problem. Even though the products proved acceptable to the public, the General Foods Corporation had no desire to expand its distribution until it was certain that suitable equipment could be had.

Most of what Mr. Harper said regarding the situation in Springfield has been printed in previous issues of the Refrigerated Food section. He added a few facts and figures, however, that have not been published. For example, the ten stores selected at the start of the campaign, took care of approximately 10 per cent of the total volume of groceries sold in Springfield. All but two were neighborhood stores. Six had never sold meat before. Three were independent grocery stores with meat departments. One, the Rood & Woodbury store downtown, had a fresh meat department.

(Concluded on Page 2, Column 3)

LABORATORY

Tests of Quick Freezing Begin

Philadelphia, Pa.—The first laboratory investigation to determine the exact effects of the new quick-freezing process upon fresh fruits frozen during their season for year-round consumption is being conducted here by Dr. J. Cecil Rhodes, director of the Medical Arts Laboratories. Fresh, tree-ripened peaches frozen in Georgia last summer will be used for the various tests.

The process employed for the freezing of peaches, and other fresh fruits, in a manner designed to make them available for the table throughout the year, with all their original freshness, flavor and color, is essentially the same as that which has been successfully used for the quick-freezing of fresh meats.

The first phase of the investigation will include tests to determine the comparative food value, solid content, fruit sugar content and flavor, of the frozen fruit and fresh peaches of the same variety purchased in produce markets. A second phase of the investigation will go into the matter of vitamin content.

NEW ORLEANS

(Continued from Page 1, Column 1)
sults in Syracuse, but declined at present to make public any figures.
He conferred Monday with the special sales force which has been conducting an aggressive campaign to put Nordic steaks in every worth-while retail outlet in the New Orleans trading area. The salesmen have been headed by Russell Yelton, Western sales manager for Atlanta Coast Fisheries.

An advertising campaign lasting approximately twelve weeks will be conducted in this New Orleans business district. The chain stores, too, are taking to the product, and we already have a brisk trade with the Atlantic and Pacific, American Food, and Grand Union stores.

SYRACUSE

Syracuse, N. Y.—Success having attended its campaign to establish the sale of Nordic frozen fish steaks in the city of Syracuse, the sales force of the Tobin Food Company, distributors of the product, this week moved en masse on retailers of the surrounding territory. For the next few weeks efforts of the organization will be bent toward introducing the new Nordic product to the trade in the nearby towns. N. C. La Casse, of the sales organization of the Atlantic Coast Fisheries, is in charge of the Syracuse campaign for the producers of the new product.

In speaking of the results of the campaign to date, Mr. La Casse said: "Of course, it is too early to attempt to talk about definite results. No attempt will be made to compile figures or arrive at conclusions concerning our efforts for some time. However, I can say that the results have been far better than our

most optimistic estimates. We have had about a 100 per cent increase in frozen fish sales in Syracuse since the opening of our drive over our sales for the same period last year. This increase has been achieved despite adverse weather conditions. An active fish market is dependent upon cool or cold weather, and so far the weather has been surprisingly mild."

Frederick C. Clark, manager of the Tobin Company, spoke enthusiastically of the reception of the steaks in Syracuse.

"Although the better class of trade is especially receptive," he said, "we are finding little difficulty in placing the frozen steaks in all classes of stores. The chain stores, too, are taking to the product, and we already have a brisk trade with the Atlantic and Pacific, American Food, and Grand Union stores."

"Many stores which never handled fish before are handling frozen fish steaks. Package fish is appealing strongly to the retailer as well as to the consumer. Frozen fish steaks are proving especially popular in cafeterias and restaurants. There, where efficiency and convenience of handling are of paramount importance, we merely have to place some of the steaks on trial to assure us of an order. Our experience with the cafeteria of the Continental Can Company here is typical. I left a package for a trial on Thursday and the next morning the manager phoned an order for the Friday business. Each week since then their order has increased."

BRUNSWICK-KROESCHELL FOR FOOD SHOP

Stamford, Conn.—John Gardella's food shop, 615 Main Street, has had a Brunswick-Kroeschell refrigeration plant installed by the Richmond Refrigerating Supply Company of 305 Flaxhill Road, South Norwalk.

ADVOCATES

(Continued from Page 1, Column 5)
partment employing eleven meat cutters. Then he brought out his sales facts beginning with the statement that between March 6th when the campaign began, and October 11th, 95,000 sales of Frosted Foods had been made in Springfield (not 95,000 items, for the total of items was much larger, some sales running up to \$2.50 to \$3.50) but 95,000 separate sales transactions.

Repeat business over the same period has averaged 80 per cent. It has been as low as 71 per cent and as high as 90 per cent.

Second grade meats at lower prices, introduced in September, are rapidly gaining on the first grade meats. Mr. Harper expressed the opinion that the eventual ratio will be 65 per cent second grade sales to 35 per cent first grade.

Items that were introduced with considerable misgiving are doing well. Quick-frozen poultry at 65 cents per pound has been sold in competition with fresh killed poultry at 35 cents per pound. Hamburger, which must be defrosted if it is to be moulded before cooking, has been a sales leader ever since it was introduced. It led all he rest in its second week.

The housewife was thought to be anxious to pick out particular pieces of meat. In Springfield she isn't. Just 10 out of the 95,000 have insisted on pointing out the pieces they wanted.

Advance orders have rolled in. On one Saturday Mr. Harper took a chain store executive from the West to the Long Meadow Thrift store and found ten cases of roasts piled up. Every one of them had been ordered during the week for delivery on Saturday. On that particular day that store did a business of almost \$200 in frozen products.

With those facts on the record, Mr. Harper selected the Sumner Avenue Thrift store as his typical example, and gave the sales figures week by week from Saturday, March 15th, when the campaign was a little more than a week old, to Saturday, October 11th.

March 15	.....\$334.92	July 5	.....\$343.19
" 22	.....380.69	" 12	.....288.99
" 29	.....372.68	" 19	.....268.08
April 5	.....460.03	" 26	.....277.77
" 12	.....489.81	" 2	.....385.30
" 19	.....405.45	" 9	.....268.15
" 26	.....464.43	" 16	.....174.58
May 3	.....422.03	" 23	.....219.41
" 10	.....420.73	" 30	.....205.24
" 17	.....423.26	Sept. 6	.....369.10
" 24	.....400.85	" 13	.....360.83
" 31	.....464.89	" 20	.....385.00
June 7	.....367.14	" 27	.....351.81
" 14	.....398.78	Oct. 4	.....341.97
" 21	.....381.28	" 11	.....373.23
" 28	.....364.65		

Mr. Harper added a word or two of explanation, attributing the slump during July and August to the going away on vacations of the class of patrons on whom the store depends, and pointing out that the introduction of the second grade of meats in September reduced the dollar sales totals without diminishing the volume.

He then made one of his strongest points in favor of quick-frozen meats. A recent survey of 4,800 chain stores scattered throughout the country, shows weekly average sales of \$367. The weekly average for the Sumner Avenue store in Springfield, selling a brand new product, is \$359.52.

Turning to his second objective, the pioneering of adequate refrigeration equipment, Mr. Harper admitted frankly that the first cases used had not stood up. Case after case has been tried, and every variety of trouble has been encountered. Doors have stuck, the glass has frosted over, the units have worked themselves to death. Three refrigerants have been tried. At first SO₂ was used, then methyl chloride came into favor and now ammonia seems to be in the ascendant. Redesigning of cases has been the order of the day, and the case manufacturers have worked hard and willingly to solve the problem.

Warning his hearers to be sure of their ground before buying refrigeration equipment for handling quick-frozen foods, Mr. Harper stated that there are now five manufacturers whose cases have come successfully through the tests imposed in the Boston laboratory conducted by Gardner Poole. General Foods has insisted on a guaranty of one year's efficient service from the manufacturers, and in turn expects fully three years' work out of the cases.

By the time General Foods is ready to expand its operations, which is not far away, Mr. Harper expects that there will be eight or ten manufacturers with suitable cases which can be bought by the retailer for under \$1,000, and at least one of them for \$550.

He believes that the case problem is well on its way to solution, but it has been a hard struggle and there are still considerable development and refinement ahead.

In conclusion, Mr. Harper declared that he was convinced that the era of packaged frozen meats was coming, that they can be sold as cheaply as groceries, that they will cost the consumer no more than fresh meats, and will help to level out price fluctuations. His final statement on which he put his greatest emphasis was that for the retailer, quick-freezing ends the perishability of

(Continued on Page 4, Column 3)

ADVENT

Of Fall Boosts Frosted Food Sales In Springfield

Springfield, Mass.—Sales of the Birdseye Frosted Foods in 18 stores of this city and vicinity are said to have shown moderate gains since the advent of fall. The most notable feature about the patronage is the large number of persons that have formed the regular habit of buying the Birdseye items, week in and week out, and counter men are still remarking upon the high percentage of repeat customers, a point even more striking, apparently, than when the campaign was in its earlier stages. The thing most needed, it seems, is to extend the ranks of these regular devotees.

General Foods is meeting the situation by advertising that stresses the advantage of buying meats in packages from which bone and waste portions of every kind have been eliminated, and which also reduce the work of preparing meals to a minimum. An encouraging feature is seen in the continued good showing made for the quick-frozen foods in neighborhoods where intelligent, thinking elements predominate. These gains are attributed to the advertising which is doing much to educate the buying public in Springfield.

Indications of a purpose to widen the merchandising field for the Birdseye lines is indicated by the institution of a school for salesmen, under the direction of Paul Kent, district supervisor, who, with other General Foods representatives devotes his efforts to stimulating sales. Young men taken on as students are taught all about the new ways of preparing and selling foods; they are given counter experience and in some instances have watched the foods being frozen, preparatory to being shipped to this city. After they have been put through the paces, these students are in line to become regular salesmen or supervisors. Every store in which the Birdseye line is sold is closely supervised, and it is understood that when the system has been developed more fully a supervisor will be assigned to each group of perhaps four or five stores in a particular neighborhood.

To increase the zeal of store heads and counter men, a new series of weekly contests was inaugurated recently among the smaller stores selling these foods, and the Red Riding Hood Store, in East Springfield, took the prize for making the highest percentage gain for the week ending October 11.

Many features make Percival DUO-TEMP

A Quick Seller to Merchants Everywhere

It not only provides, in one counter, space for quick-frozen foods and ordinary foods, but it has many conveniences besides.



Two Counters in One

20-degree or freezer end insulated with 4" cork board and equipped with four plate glass for front display and with bracket type 7/8" offset, double gasketed, bottom hinged doors in back of display section.

40-degree end insulated with 3" cork board and equipped with three plate glass in front display and with doors for quick service, sliding on Monel metal track, closing against gaskets.

Overhead coiled, porcelain covered, Monel trimmed, made for mechanical refrigeration any make or type.

Get the facts

Write for
details
today



C. L. Percival Co.,
Des Moines, Iowa.
Without obligation, please send special folder giving detailed specifications and full information about Percival out-of-the-ordinary sales units and your dealer proposition.

Firm name
Address
City State
What other specialty lines are you now handling?

Many merchants will eagerly buy this case. Get full facts about it NOW.

C. L. PERCIVAL Co.
DES MOINES, IOWA
Manufacturers of Quality Refrigerators since 1912
Established 1886

Free Refreshments

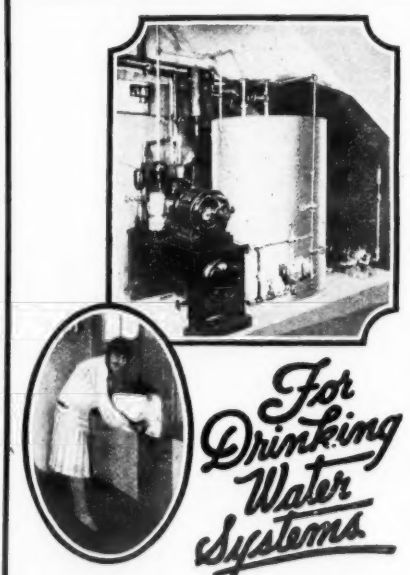


Milwaukee, Wis.—A three-cornered tie-up was effected here recently, the Uptown Theatre, the Pabst Corporation, and the E. H. Schaefer Corp., General Electric distributors in Milwaukee, being the participants. For two weeks the Uptown Theatre served refreshments, including soft drinks and crackers, on the mezzanine of the theatre to all patrons requesting them.

The E. H. Schaefer Corp. placed three electric refrigerators in the theatre in connection with the tie-up. One model

was on display in the lower lobby of the house, and two were on the mezzanine. Each carried a placard with the Schaefer and General Electric names.

The serving of free refreshments, the cost of which was covered by the Pabst Corporation, was advertised by the theatre in its lobby, newspaper and program advertising. Thousands of persons took advantage of this offer. The soft drink and cheese refreshments served to the patrons were kept cool in the three refrigerators.



Refrigeration

For office buildings, hotels, hospitals, stores, etc., the central cooling system for drinking water with positive circulation, offers many advantages.

Use Frick Refrigeration for these and other commercial jobs. Capacities from 1-2 ton up. Get the facts on Frick Refrigeration today: write



AIR CIRCULATION

Its Relation to Refrigeration

By Geo. R. Lindahl

Vice-President, Commercial Refrigerator Mfg. Co., Los Angeles

EVERYONE in the refrigeration industry is vitally interested in circulation of air and in view of this it is surprising how little seems to be known by those engaged in this industry concerning the physics of the air. Many individuals who have been in refrigeration work as long as twenty years are inclined to take too much for granted in controlling the air in refrigeration work.

With the introduction of quick-frozen foods and with the request by the producers for "restricted air circulation," manufacturers of equipment all over the country have been making startling changes in their methods of refrigeration distribution. Some of these changes, instead of restricting circulation, actually speeded it up. This article may help to clear up some of these disputed points.

In the first place it is well to point out that "dead air" is something that is physically impossible, due to atmospheric differences in pressures and temperatures. Even the slightest difference will cause air to move, and no human has ever been able to make air stationary.

What Is Atmospheric Circulation?

Definition: Atmospheric circulation is a gravitational phenomenon induced and maintained by temperature differences. Temperature differences are induced by pressure differences and differences in volume. Air currents or air movements are divided roughly into two distinct classifications: i. e., vertical and horizontal, and these are in turn roughly divided according to the direction and speed of flow as follows:

1. Air fountains.
2. Air sink.
3. Air cataracts.
4. Aerial cascades.
5. Wind layers.
6. Wind billows.
7. Wind gusts.
8. Wind eddies.
9. Air torrents.
10. Air breakers.

Any of these air movements are caused by differences in atmospheric pressures. As an illustration, "air fountains" flow upwards, "air sink" flows downward, "air cataracts" resemble a water cataract, etc. The causes of differences in atmospheric pressures are due to a reduction in volume of a given quantity of air. This reduction in volume is due to condensation caused by the warmer air coming into lower temperatures.

What Is Vapor Pressure?

Vapor pressure is determined by the quantity of vapor in the atmosphere. As air becomes warmer it will expand and hold a greater quantity of moisture. As it cools below the saturation point some of this moisture condenses and leaves the atmosphere in the form of hail, frost, snow, dew, or rain, depending on the volume of condensation and the temperature under which it condenses. As an illustration of this we will use in this example a cubic foot of air that is saturated, i. e., all the water that it can hold in suspension.

At 100 degrees F. a cubic foot of air can hold 19.79 grains of moisture. The vapor pressure will then be 1.916 inches. The total weight of this saturated air at this temperature will be 487 grains.

Let us take this same air and cool it down to 30 degrees below zero F. (-30 F.). All the moisture that a cubic foot of air at this temperature will hold will be 0.12 grains per cubic foot and the vapor pressure would then be 0.010. The total weight of a cu. ft. of this saturated air would then be 650 grains. From this it can be seen that as the moisture is removed from the air by cooling, that the air becomes heavier in weight and shrinks in volume.

Now we will assume that we have a refrigerator and we place the refrigerating coils in the usual space overhead. We will use an ammonia compressor and operate it on a suction pressure of about 1 in. of vacuum, which is quite extreme for this type of machine. The boiling

point of ammonia at 1 in. of vacuum is about thirty degrees below zero F. (-30 F.). We will then assume that the temperature of the coil itself is the same. Before we operated the machine the refrigerator was 100 degrees F. with a relative humidity of 100 per cent (saturation point).

The pressure of the atmosphere immediately surrounding the coil would be, when the machine is operating, 0.010 in. and the vapor pressure in the room to be cooled is 1.916 in. It is inevitable, is it not, that the pressure in the room will follow the line of least resistance and "surge" to the point of lowest vapor pressure? This warm air coming in contact with the cold coil immediately loses 19.67 grains of moisture, which is given up to the cold coil. As the moisture is removed the air increases in weight from 487 grains to 650 grains per cubic foot. By becoming heavier (denser), it naturally falls. The up-going warmer air will not fight to pass through this descending air, but literally "steps out of the way" and follows the line of least resistance. That is why there is always two or more separate air currents ascending and descending.

Now if we could maintain a 30 degree below zero coil and a 30 degree below zero room there would not be any circulation of air, as the vapor pressure at both extreme points in the refrigerator would then be the same. However, this is not possible, and no engineer has ever been able to accomplish this. It is easily seen then that "dead air" is a physical impossibility. The only way that movement of the air can be restricted is to bring the coil and room temperature as closely together as possible. The only way we can accomplish this is to use a warmer coil. We must then add more coil, as the rate of conductivity through a square inch of coil area is reduced as the temperature is increased.

Circulation and Humidity

Even if we could bring the coil and room temperature together to the same degree, it would not be advisable, as moisture from the entering air would condense and deposit on the surface of the foods in the room, on the walls, ceiling, floor, etc. We must maintain sufficient air movement to carry this moisture to the coils, where it can be condensed and run off through the drain pan. Humidity is defined as "the state of the air as regards moisture" and relative humidity is defined as "the ratio of the actual amount of water vapor present in the air to the amount of vapor it would hold if it were saturated."

If we maintain the coil at the same temperature as the room (which we must do if we desire "still refrigeration") the entering air which may be saturated with moisture will condense on everything in the room, causing foods to become sticky and slimy. To have a better understanding of humidity and

surface of the foods or it can cling to the walls, floor or ceiling of the refrigerator, which is not a very satisfactory condition from the standpoint of preserving the foods, and even the box will soon become mouldy and rot.

We must get rid of this excess moisture, and the only way this can be accomplished and still maintain temperatures is to bring this air to the coils before it can drop its excess moisture on the foods. As the coils are always colder than the balance of the refrigerator, the amount of moisture that will be deposited on the coil will then depend on the temperature of the coil. We must bring this air to the coil by circulation (convection air currents). We cannot depend on sheer conductivity, as that is too slow, because air itself acts as an insulator and the drier the air the greater insulation value it has. Assuming that the coils are maintained at a zero F. temperature, the air passing over the surface of the coils would then be dried to the amount of moisture it could hold at this temperature, which would be 0.54 grain per cubic foot.

Coil Removes Moisture

As the entering air was 75 degrees and 80 per cent relative humidity, it held in suspension 7.5 grains of moisture. This same air passing over the surface of the zero coil could only hold 0.54 grain of moisture, which would be saturation at this temperature. Then we would lose 7.5 minus 0.54, or 6.96 grains of moisture from every cubic foot of air that passed over and was in direct contact with the coil.

By losing this amount of moisture the air became heavier and descends. On its way down it comes in contact with foods containing moisture and other moist air. This cold dry air picks up moisture from any object that contains more moisture than it does. As it absorbs this moisture its temperature increases, thus builds up a greater vapor pressure when it again returns to the point of lowest vapor pressure. In this

manner is the cycle of circulation completed.

Due to this difference in vapor pressure between a zero coil and a 75 degree room, which is 155 inch. (approximately) the upward movement of the air is quite rapid and the downward movement is at approximately the same speed. We will assume as an example that the complete cycle occurs within the refrigerator every minute. Now, if we operate the coil at 20 degrees F., instead of at zero, we only have a vapor pressure difference of 0.90, instead of 1.55. We thus reduce the speed of the air about one-half, as we have reduced the difference in vapor pressure about this amount. The air then will travel at about one-half the speed as it did formerly. The dry air then will pass over the surface of the foods one-half the number of times it did before, so dehydration would be reduced 50 per cent. Where too low a coil temperature is used, dehydration of fresh perishables can be as high as 5 per cent of the volume of food handled per 24 hours. It can then be seen that dehydration depends purely on the speed of circulation, which in turn depends on its speed by the difference in temperature between the coil and the room that is being cooled.

Moisture Causes Oxidation

If we go to the other extreme and operate the coil at too high a temperature, the air will be "sluggish" and will not pick up the excess moisture and carry to the coil before it deposits on the food. Precipitation of moisture on fresh foods as well as on frozen foods causes oxidation, which in turn causes discoloration. So if we are to keep away from both discoloration, due to dehydration, we must strike a balance so that the air will be moving at just the right speed to "take up" the excess water from the air without removing any from the foods that are being cooled. The matter of what is proper in the way of distribution and quantity of coils, coil temperatures, etc., will depend on factor of service, insulation and position. There is no such thing as engineering a job at a factory and shipping it everywhere under all kinds of conditions, and make it operate the same in all conditions and climates. A balance can be struck that may give satisfactory service under all conditions, but never what can be considered as a "perfect job of refrigeration." Anyone that is attempting this is going to be up against a real job.

The purpose of this article is to give the engineer a better working knowledge of air currents, so that he will make the minimum number of mistakes in laying out refrigeration for any specific purpose. The subject of frozen food refrigeration will be gone into in detail in another article.

FRIGIDAIRE GETS RIGHT NUMBER

Bridgeport, Conn.—Downes-Smith Company, 540 Fairfield Avenue, Frigidaire dealer, has completed installation of refrigeration equipment in the cafeteria located on the fourth floor of the new Southern New England Telephone Company at John and Courtland Streets. The cafeteria is for employees of the telephone company.

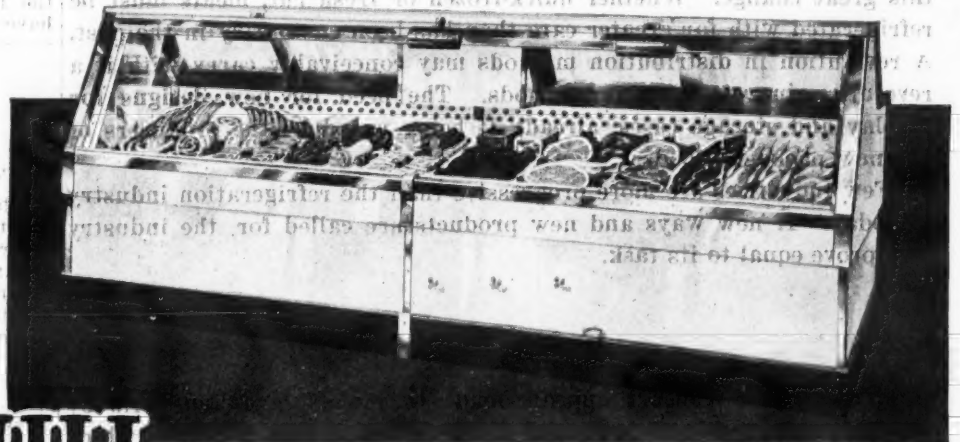
The equipment consists of a Seeger cabinet of 45 cu. ft. capacity, with a Frigidaire N compressor and 570F coils; a two-hole ice cream cabinet with B compressor, and a 400-lb. ice-maker with C compressor, according to Kenneth D. Woudy, service manager.

Downes-Smith has also recently installed a Frigidaire AP 35 refrigerator with K compressor and 560F coils in the Ernest Lunch, State Street.

WATER COOLERS

New Haven, Conn.—Three pressure-type water coolers have been installed in the new Masonic Temple Building, Whitney Avenue, by Modern Home Utilities, Inc., 1102 Chapel Street, General Electric distributors.

Here's a case... that proves attractiveness pays



The Hill Dry-Cold with

Silvery Monel Metal Trim

DISPLAY case salesmen have discovered the sales value of good appearance. So have their customers! On every hand you see stores which have been "dressed up" by the installation of bright, new display cases.

Monel Metal is being used by C. V. Hill & Co. Inc. of Trenton, N. J. and other leading manufacturers because they have learned that Monel Metal—and only Monel Metal—offers all the advantages essential to a trim material.

The silvery beauty of Monel Metal is permanent—practically ageless. It will not rust. It resists corrosion and discoloring influences. Monel Metal has no coating to chip, crack or wear off.

To meet today's requirements, modern equipment must be economical. Because it lasts longer—because it saves cleaning and upkeep expense—Monel Metal is economical to a remarkable degree.

In purchasing new display equipment, ask your manufacturer about Monel Metal. Or let us supply you with more information.



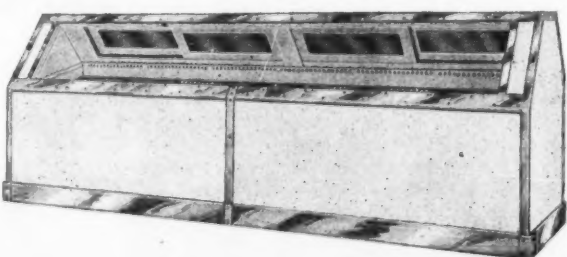
Monel Metal is a registered trade mark applied to a technically controlled nickel-copper alloy of high nickel content. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

Commercial Refrigerator Equipment For All Purposes STOCK or SPECIAL BUILT

BANTA REFRIGERATOR COMPANY CLEARFIELD, PENNSYLVANIA



REFRIGERATED FOOD SECTION ELECTRIC REFRIGERATION NEWS

The Business Newspaper of the Refrigeration Industry

Published by

BUSINESS NEWS PUBLISHING CO.

550 Macabees Building, Woodward Avenue and Putnam Street
Detroit, Michigan. Telephones: Columbia 4242-4243-4244

Subscription Rates:

United States and Possessions: \$2.00 per year; three years for \$5.00
All Other Countries: \$2.25 per year; two years for \$4.00

Advertising Rates on Request

F. M. COCKRELL, Publisher

WILLIAM JARINE, Editor

FREDERICK W. BRACK, Advertising Mgr.

JOHN DRITTLER, Managing Editor

GEORGE N. CONGDON, Business Manager

GEORGE F. TAUBENECK, Assistant Editor

Eastern Manager: H. A. DeLashmuth, 1950 Graybar Bldg., New York, N. Y.
Phone Lexington 9113

Chicago Representative: F. W. Henkel, 306 S. Wabash Ave., Phone Wabash 6668
Copyright 1930 by Business News Publishing Co.

VOL. 5, No. 4, Serial No. 106, Part 2

October 22, 1930

Progress

JUST a year ago when the packers of the country were holding their annual convention in Chicago, there was much enthusiastic theorizing about the possibilities of packaged, quick-frozen meats. But it was nearly all theory; nobody had any real facts.

In the twelve months that have elapsed, facts have taken the place of theories, and those who were inclined to scoff at the theorists are cognizant of a new situation. They realize that a new era in the distribution of meat products is at hand.

And quick frozen meats are not alone in their history-making work. So far as the packaging question is concerned they have an able ally in the fresh cut, packaged meats that are being sold so successfully in the New York district by the Slotkin and Bohack organizations. Both processes help to educate the consumer to the value of packaged meats.

The Springfield campaign in the East, the Muncie test in the Midwest, steadily increasing sales of Swift's identifiable cuts, the springing up of stores like Yale's, in Meriden, Connecticut, all indicate that the great revolution in meat distribution is gathering force. How long it will take to sweep the country is something on which even its warmest advocates wisely will not venture an opinion, but they are all sure that their day is coming.

Refrigeration is certain to be one of the first direct beneficiaries of this great change. Whether quick-frozen or fresh cut, meats must be refrigerated with far greater care than has been customary in the past. A revolution in distribution methods may conceivably carry with it a revolution in refrigeration methods. The need for new designs for display and storage cases, already is being urged by the producers of the new packaged foods.

Few industries are more progressive than the refrigeration industry of today. If new ways and new products are called for, the industry will prove equal to its task.

Sanitation

ONE of the strongest appeals made to the average housewife by packaged products is that of safety. She realizes that food which is securely wrapped by the producer has a sanitary quality that products handled in the old-fashioned way never can have.

So much attention has been paid to the other talking points in favor of packaged meats, both quick-frozen and fresh, that the sanitary argument is not heard as often as it ought to be. Flavor, tenderness, elimination of bones and other waste, have been repeatedly urged, and even convenience has usually been mentioned before sanitation.

There are strong evidences that many housewives are buying packaged meats with just one thought in mind—that they are safe because they are not handled exposed in the retail store. Up in Springfield, the Massachusetts city made famous in food circles by the Frosted Foods sales campaign conducted by General Foods, A. H. Phillips, who runs a chain of stores and who sells Swift's quick-frozen meats, is making capital of that desire for meats that are safe. Here is the blunt way he puts the sanitary argument in his newspaper advertising—in big black type.

"NO MADAM, no meat blocks in our stores with flies walking around. We don't believe meat blocks spell M-O-D-E-R-N."

"Visit one of the following stores and inspect the new handsome refrigerators just chock-full of clean, sanitary, no-waste cuts of your favorite meats—priced (elimination of waste and quality considered) lower than you dreamed such meats could be."

That's the way Mr. Phillips feels about it. The usual arguments are all there, economy, no-waste, but first and foremost comes sanitation. That distressing creature the common fly is brought in to make the picture more vivid.

As the new packaged products become more familiar and are sold in stores all over the country, instead of in scattered cities as they are at present, it will be the appeal of cleanliness and safety that will carry them forward. General Foods found that quick-frozen packaged spinach could be sold in Springfield in competition with fresh spinach, and so far as anyone could discover, the only reason for that phenomenon was that the quick-frozen spinach was clean.

Anything that helps to safeguard the public health is sure of success in this modern-minded nation. And packaged products do that very thing.

Chicago Buys Swift's Quick-Frozen Meats



Oreole and Kelvinator are on duty at this store

Chicago, Ill.—A sales experiment that may easily have far-reaching effects on the development of quick-frozen foods is now under way here. Identifiable packaged meats, quick-frozen by Swift & Co., are on sale in several stores.

The work of the General Foods Corporation in Springfield, Mass., has shown what quick-frozen foods can do with extensive advertising in a relatively small city. The work done by Swift & Company in the stores where they are on sale here is showing what quick-frozen foods can do without advertising in the second largest city in the United States. In both cases the results have been alike. The public began by purchasing the smaller items—a sort of sampling process—and finding them good, asked for the larger cuts. The repeat customers have been in about the same proportion

in both Chicago and Springfield, and that means an extremely high percentage of the sales have been to women and men who have tried the new meats and have come back for more. Confidence in the quality of meats selected and packaged by organizations jealous of their good names, has been demonstrated by the fact that in Chicago, as in Springfield, mothers have sent their children to the stores with instructions to bring home "one of those frozen steaks."

The stores selected for the experiment in Chicago are in different sections of the city, almost as far apart as they could be located.

About twenty-eight items are on sale, ranging from stew meat to chickens and roasts. The chickens have proved exceedingly popular. They are packaged in neat cartons, with cellophane-covered

tops, so that the fowls may be clearly seen. The chickens are drawn, and the giblets, heart, etc., are wrapped separately and placed inside the carton.

The other meats are all wrapped in cellophane, plainly marked with their weights, and can be inspected easily without the necessity of permitting the customer's hands or gloves to come in actual contact with the surface of the meat. This is a feature that seems to be appreciated.

The experiment thus far shows that the public likes the new products, and the repeat business is constantly increasing. Convenience, economy, sanitation and quality are some of the arguments being used effectively by those in charge of sales. Complaints are few and not serious, and are chiefly concerned with the thickness and size of the cuts.

Advocates of Packaged Foods Make Strong Case

(Concluded from Page 2, Column 4)

meats, a factor that is fraught with great significance for the future.

Mr. Slotkin's remarks on fresh cut packaged meats were brief. He asserted his firm belief that the old methods of retailing meats are certain to be displaced when true costs are understood; said that the new methods would transform the butcher from a mechanic into a merchant, and declared that the 100 stores he was operating on the fresh cut packaged plan in New York had passed beyond the experimental stage.

Frank L. Parsloe, taking the place of Henry C. Bohack, who had been called to Washington unexpectedly, told the Bohack packaged meat story that has appeared in previous issues of the Refrigerated Food section. In describing his company's work he said:

"We experimented, very carefully, at our headquarters for six months before we offered our 'Fresher Cut' brand packaged meats to prospective customers."

"We operate a chain of nearly 700 stores. Many of these stores are in strictly neighborhood locations, which do not justify large fully equipped markets such as we place on main avenues, carrying a large transient trade. Out of our total chain, only 260 locations are regular markets. The possibility of opening more stores in the neighborhood locations is much greater than the number of market locations that are available. So we find ourselves in a position to increase the size of our chain but, at the same time, limited on the number of outlets for meat."

"The latest figures available indicate that there are 62,725 chain grocery units operating in the United States at the present time. Out of this great number of stores, only 16,123 sell fresh meat. So it is quite apparent that the general situation throughout the country is just about the same as ours."

"We were particularly well equipped to venture into the packaged meat field, by reason of our exceptional facilities at our headquarters' plant. We have the largest meat cooler east of Chicago for carrying our current stocks, besides a very large pork packing plant, which is right up to the minute in every particular."

"That the trend of the times is toward packaged meat, I think we are all agreed. One great advantage that will help this new method of merchandising is the possibilities for advertising. At the present time it is nearly impossible for anyone to launch a big advertising campaign on fresh meat."

"There is somewhere between three and four billion dollars' worth of fresh meat consumed each year in the United States. Compared with other food lines, very little money is spent to advertise and sell this great amount of meat."

"When this meat can be offered under established brands, it will be just as easy to build up consumer confidence and demand for certain brands as it has been with other foods."

"Before I go further, let me make it clear that our packaged meats are strictly fresh cut. We have not, up to the present time, attempted any experiments with the frozen line. For our particular operations, there would be no advantage in freezing the cuts."

"We consider our present packaging operation as being very crude, compared with what we will be able to do when operating on a larger basis."

"We have succeeded in showing a steady reduction in production costs since the time we started. With the introduction of more automatic machinery, we know we can effect large savings over our present costs."

"As an example—a steer comes off of the packer's killing floor, and goes into the chill room, and then it is loaded into a refrigerated car which carries it

direct to our cooler, where it hangs until it goes into our cutting department, which is under the same temperature as our cooler, and directly connected with it. Here the product is cut, weighed, wrapped and tied, and then placed in a shipping box which is pre-cooled in the cutting room. This box is then charged with Dry-Ice, closed, and loaded on the truck to be delivered at the store. This shipment can be left outside of the store early in the morning before the manager arrives, and will hold the desired temperature for at least six hours. On arrival, the manager pulls the one or more boxes he may have received into his store, where he opens them and places the packages in his refrigerated display case, which is run at 32°. So you see we have the product under almost constant refrigeration."

"There are no excessive costs involved in equipping these stores. In fact, it is possible to make a general saving all the way down the line, so that the finished product may be offered to the customer as low in price, or lower than might be required under the ordinary method of selling meat."

"The store equipment consists merely of an 8-foot electric lighted refrigerator case, having the maximum display space with a storage compartment underneath. We install a small ammonia compressor, which takes care of the butter-box as well as this case. No tools, scales, blocks or ice-box are required."

"The sales expense at the point of sale is very low, since any clerk, or boy, in the store can sell these packages just as easily as he would a can of tomatoes or a cake of soap."

"Centralized cutting makes it possible to utilize the skilled butchers' time much more efficiently than can be done in the store. These men are kept busy constantly cutting from the time they punch the time-clock and put on their white frock, until they check out."

"You see after all our scheme is very simple. We have not introduced any factors, with the exception of Cellophane, which could possibly increase the cost. No matter how you handle meat, someone must cut it—someone must weigh it and tell the customer how much it will cost, and then it must be wrapped. The only difference in our method is that we wrap the product in Cellophane and, by centralization, are able to do all of the other necessary operations more efficiently."

"We see that packaged meats are the coming thing, and we want to be in step with the times."

KINGAN & CO.

Puts Out Quick-Frozen Meats

Chicago, Ill.—Refrigerated cases were conspicuous in the exhibit rooms in the Drake Hotel during the convention of the Institute of American Meat Packers. McCray, Ottenheimer, Ligonier, Zerone, and DoleCo., all were represented either by refrigeration units or cases.

Several of these cases were parts of the exhibits of the DuPont Cellophane Company of New York, the Shellman Products Company of Chicago, and the Milprint Products Co. of Milwaukee. The last two organizations print labels on Cellophane for many of the packers.

In the low temperature cases were the quick-frozen meats of nearly all the companies now in the field, including at least one newcomer, Kingan & Company of Indianapolis. A couple of cartons of Kingan's Reliable pork chops—quick-frozen—were nestling comfortably in the Shellman case.

Other quick-frozen meats on display in their Cellophane wrappers were from Swift, Wilson, Birdseye and Cudahy.

VARIETY

Of Fall Fruits Simplify the Menu Problem

By Mrs. Phyllis K. Dunning
Home Service Director, The Society for
Electrical Development

THE fruit market, with so many kinds of melons, grapes, pears, peaches, apples, etc., at this time of the year is a den of temptation. One finds it quite hard to pass up the "take me home" appeal of the luscious products, and as a result housewives buy heavily in the fall season.

Of course, the problem of spoilage isn't what it used to be. Since the domestication of electric refrigeration the housewife is pretty safe in laying in generous quantities of produce, for it will keep for a remarkably long time, and furthermore, the flavor of many fruits is actually improved by their being kept in the refrigerator. It is a good thing to remember, however, that fruits do not require the coldest spot in the cabinet, and that you should not put them there. Instead, place them in the warmest place, which is the upper shelf to the side of the cooling coil. By placing them there you entirely eliminate even the slightest chance of the odors of the fruits being transmitted to any other food in the cabinet.

Delicious as thoroughly chilled fruits undoubtedly are when eaten as is, there are many interesting ways in which they may be prepared to add variety to the menu. Here are a few favorites:

Grapes in Lime Jelly

Get a package of the new lime-flavored gelatin and prepare it according to directions. When just beginning to set, add three-quarters of a cup of seedless grapes, cut in half. Set in refrigerator to become firm. Serve in sherbet glasses, with the grapes on top, if they settle, which they usually do.

Some Fruit Salads

Sombody once said that you could use anything in a fruit salad, and the saying spread like wild fire. Well, you can, but you won't get as delightful results as you will if you use a little thought and discrimination in your combining. Bartlett pears, peeled and seeded grapes and melon balls make a delicious salad. So do grapefruit sections, slices of melon and avocado pears. A carefully cooked prune, stuffed with cream cheese, is a nice focal point about which to arrange these salads in individual servings.

To still further improve your fruit salads, serve them with a dressing made of half mayonnaise and half whipped cream, or crush a few tablespoons of pistachio nuts and add them to the mayonnaise just before serving.

Pear Salad

Select firm, ripe pears and chill them thoroughly in the electric refrigerator. Peel them, halve and core them. Soften a cream cheese with a little heavy cream and add pulverized nuts—pistachio or almonds or pecans are best. Form into balls and place in the cavity of each pear half. Place on lettuce leaves and serve with French dressing.

Melon Ball Cocktail

Cut melon in half and remove seeds. Scoop out the balls, using a French cutter or the ½ teaspoon in your measuring

set. Cover with grapefruit juice to which a few drops of bottled lime juice have been added, and sweeten slightly to taste, using powdered sugar. Place in freezing pan of your electric refrigerator and chill thoroughly but do not freeze.

Fruit Cup Supreme

Prepare a mixture of fruits, cut into small pieces, and chill thoroughly in refrigerator. Any mixture of fruits may be used, oranges, pineapple, apple, peach and maraschino cherries, making one good combination. Buy or make a quantity of lemon ice and store it in a tray in the freezing compartment of the refrigerator. At serving time put a portion of the fruit mixture in the bottom of each sherbet glass. Over the top spread a layer of lemon ice and garnish with cherries, angelica or mint leaves.

Baked Pears

Wash and peel six firm pears and cut them in halves lengthwise. Remove the cores. Place the pears in a buttered baking dish. Sprinkle them with a mixture made of two tablespoons of sugar and ½ teaspoon of cinnamon. Add ½ cup of water, cover the dish and bake in moderate oven for about one hour or until the pears become soft, which may be determined by sticking a fork into them. Chill thoroughly and serve with sweetened whipped cream.

PACIFIC COAST HOME ECONOMIST ACTIVE

Los Angeles, Calif.—Miss Alice Robertson, newly appointed home service director for the George Belsey Company, distributors, addressed one thousand women attending the cooking school of Miss Mildred Kitchen, of the Los Angeles Herald. She discussed the subject of electric refrigeration in general.

Miss Robertson also has appointments to talk before Long Beach, Alhambra, Pasadena, Glendale, San Pedro, Hollywood and Santa Monica newspaper cooking schools, in connection with Mrs. Florence Austin Chase, who represents the M. C. Morgensen & Company, owners of eight newspapers.

FOOD EXPERT NOW WITH COPELAND-CHICAGO

Chicago.—Miss Helen Forrest, home economics and domestic science expert, has been engaged by the Chicago branch to educate customers to get the most possible good use out of their Copelands.

By appointment, she gathers the ladies into a kitchen in an apartment building and demonstrates how to make frozen desserts. In addition, she helps any Copeland user solve individual problems on "what to serve." Miss Forrest's menu advice is being rapidly sought after by Copeland users in Chicago.

DESSERTS AND SALADS

Douglas, Ariz.—Very effective meetings are being conducted by Miss Wilma D. Jones, Director of the Home Service Department of the Arizona-Edison Company. Demonstrations of the General Electric refrigerator were made by her at recent meetings, the last one of which was held at the utility company's Douglas store with seventeen women in attendance.

Two lectures were given. The first, "Mechanism of the General Electric Refrigerator," and the second, "The Chilling Unit and Its Uses."

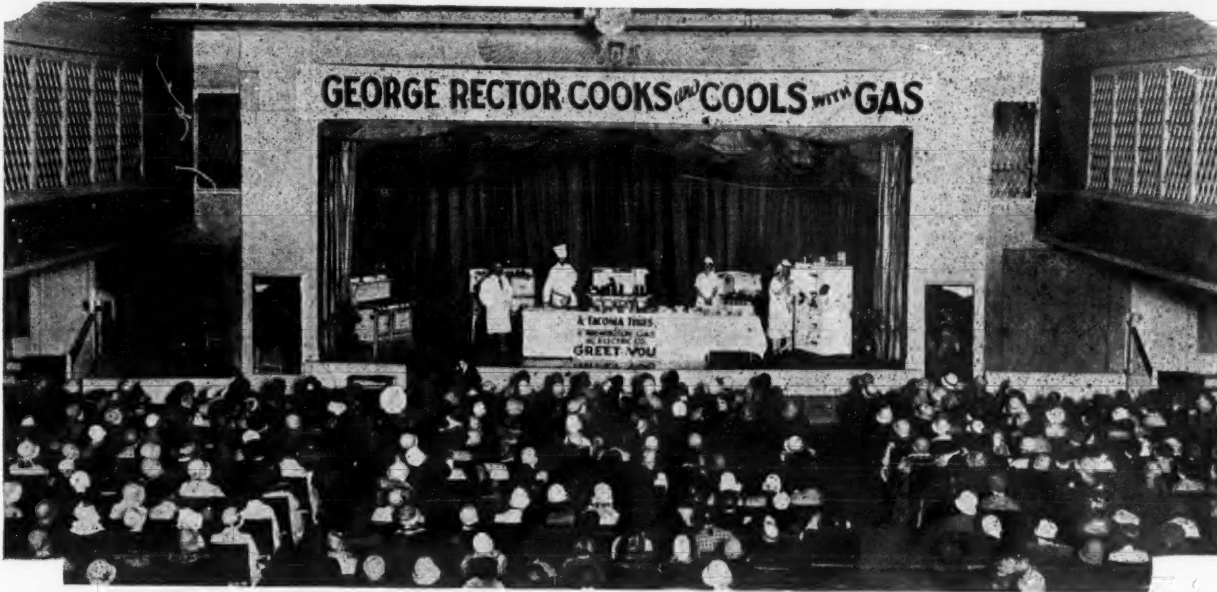
Preparing Recipes

Mansfield, Ohio.—Preparing recipes for Westinghouse refrigerators seems to be an enjoyable task. In between half a cup of this and a teaspoon of that, Miss Oliver Kaiser, home economist, Westinghouse Refrigeration Department, finds time to shop for vegetables and other items used during the course of her work. Here, we have Miss Kaiser buy-

ing green vegetables, so that she may prove that the Westinghouse refrigerator "will pay for itself." Westinghouse advertising and sales demonstrations stress this point, and at the same time show the prospect how an electric refrigerator, by eliminating spoilage of foods, will pay for itself in a short time. This order should tell the tale.



Home Economics on the Pacific Coast



George Rector, famous restaurateur, and Electrolux co-operate at Tacoma Cooking School.

Dayton Model Food Store 100% McCray Equipped

In the Dayton Model Food Store—the last word in food store arrangement and equipment, McCray refrigerators were chosen by the committee after an exhaustive survey. Mechanical cooling units were installed.



Approved by national authorities, this model store (interior shown above) was to present the finest, the most efficient, most economical display, storage, and service facilities so that operating costs would be at a minimum and bigger profits result to the merchant.

The fact that McCray refrigerators were chosen again proves that where unfailing service and efficiency in operation are demanded, McCray equipment is standard. This is of utmost importance to every dealer in mechanical refrigeration. With any type machine an installation with McCray means permanent, satisfactory service—less cost for current, elimination of spoilage losses, and foods kept fresh and wholesome.

There are models for every commercial need. Write for catalogs and information about the McCray line. Machine refrigeration dealers should get the facts now. No obligation.

MCCRAY REFRIGERATOR SALES CORPORATION, Department 66, Kendallville, Ind. Salesrooms in All Principal Cities. See Telephone Directory.

ALL McCRAY MODELS
MAY BE USED WITH
MECHANICAL
REFRIGERATION OF
ANY TYPE

MCCRAY Refrigerators

WORLD'S LARGEST MANUFACTURER OF REFRIGERATORS FOR ALL PURPOSES

Preparation of Peaches For Freezing

By J. G. Woodroof

It is desirable that all preparation of peaches for serving be done before they are frozen. It is uneconomical to freeze inedible portions. It is also desirable that frozen fruit should be served before or immediately after being defrosted.

More skill is needed for correctly handling peaches for freezing than is required for peaches that are either to be canned or shipped fresh.

Shipping peaches are picked, hauled and packed while yet firm and will stand more rough handling than peaches to be used either for canning or freezing. Peaches for canning will stand more bruising than peaches for freezing because subsequent cooking for canning destroys any brown discoloration which may develop, whereas in freezing this is not possible.

It is imperative that peaches for freezing be soft ripe and it is desirable that they reach this stage as nearly as possible before being picked from the tree. Only experienced peach pickers and packers can understand the delicate task of handling soft ripe peaches from tree to shed without bruising. Pickers must be trained to recognize soft ripe peaches without mashing with the thumb; and after once being placed in the trays the peaches should not be removed until they are to be peeled. This necessitates all the grading being done immediately before peeling.

The tendency of certain varieties, as the Carman and Belle, to ripen unevenly presents a serious problem. It often happens that the blushed side will become soft ripe while the opposite side is green and firm. When preparing such peaches for freezing it is desirable to discard all parts that are firm and use only the soft ripe areas.

If it is found impractical to allow the fruit to become "soft ripe" on the tree, the next best plan is to pick the fruit while "firm ripe" one day earlier than it is intended to use it. After remaining in the shed for 24 hours it will have become soft and suitable for freezing. Far less bruising is caused by handling peaches in this way, but it has the disadvantage of requiring twice the amount of floor space in the unloading shed and twice the number of containers.

Storing Facilities

It appears that a storage room equipped to maintain a constant temperature at about 36° F. is desirable, and should be included in the general plan of buildings. Such a room would be used for storing peaches when the volume of fruit coming into the plant is temporarily greater than is being used. It seems necessary to provide a temporary storage room in which the processes of ripening will be arrested in the event of a temporary shut-down of the plant due to high temperatures in the freezing room, holidays, etc.

A second use to be made of a high temperature (36° F.) storage room is a place in which to store fresh fruit and prolong the period of operation of the plant from five to fifteen days for any single variety. Work at this Station for a series of years has shown that during growing seasons, when there is not an excess of moisture in the soil, firm ripe fruit can be kept in common storage for three weeks with little harm. In rainy seasons this time is reduced to nearly half. Fruit should be kept in storage just long enough to allow it to become soft before being used. From six to twenty-four hours may be needed for this.

Stored peaches undergo a series of

important biological changes which affect the color, taste, and aroma. During the first two weeks in storage there is a decrease in moisture in peaches of nearly two per cent, an increase of more than one per cent in sucrose, an increase in total acid, and a slight increase in reducing sugars.

Studies begun in 1925 at the Georgia Experiment Station show that the first evidence of breaking down of peach tissue under common storage conditions is a physiological browning of the flesh near the seed. This discoloration is non-infectious. The kind of growing season has a great influence on the length of storage before this break-down begins. In very rainy seasons physiological break-down begins in about a week or ten days, while in dry seasons it will not develop until after three weeks.

It is evidenced by a loss of aroma and taste, loss of natural color, loss of total acid, loss of sucrose, and increase in moisture and reducing sugars. After the break-down becomes evident to the eye, it is only a few days until the peach is practically worthless as fresh fruit. Scurti and Pavarino's work in Italy closely checks our results in this respect.

Peeling Peaches

Hand peeling of peaches is slow. It increases the chances of introducing micro-organisms; requires a large amount of floor space and labor, and does not give the finish to the product that lye peeling does. From one to three hours is required for a person of average efficiency to peel a bushel of peaches by hand. The wide range of time is due to the size of peaches. It requires about as long to hand-peel a small peach as a large one; and a bushel of very large peaches can be hand-peeled in one-third the time required for peeling a bushel of small peaches. There is more waste to hand-peeling peaches than to peeling them by a chemical process.

Lye Peeling.—Canning peaches have been peeled in a 3 per cent boiling caustic soda or "lye" solution for a number of years. It is rapid, efficient, sanitary, gives a high quality product, and is adaptable to either large or small quantities of peaches.

The temperature of boiling water causes the outer surfaces of the peaches to become cooked. This is not objectionable in canning but is objectionable in peaches to be frozen. In the canning process the subsequent cooking is a continuation of the cooking already begun on the surface. But peaches to be frozen should not be cooked at any time.

The cooked surface is about 1/16 of an inch thick, is tough, and has the characteristics of cooked peach tissue in taste, appearance, and physical condition. It does not turn brown on several hours' exposure to air. Immediately beneath this layer is a region of partly cooked tissue about 1/8 of an inch thick which begins to turn brown within five minutes after removing from the bath, the browning becomes more intense for several hours at ordinary temperature. The tissue of this layer is

soft and has the very objectionable taste of being half-cooked. All of that portion between this layer and the seed remains fresh.

Laboratory studies have shown that peach tissue heated to a temperature of from 140 to 158 degrees F. (60 to 70 degrees C.) darkens much more rapidly and more intensely than peach tissue subjected to a temperature below or above this range. This is the temperature to which the layer from 1/16 to 1/4 of an inch beneath the peel is heated in the lye bath, and it is this region that develops into a brown ring in from 30 minutes to 2 hours after the peaches are lye peeled.

Studies have shown that it is the temperature of the lye bath which initiates the browning rather than the strength of the solution. The brown ring has been experimentally produced in both hand-peeled and unpeeled peaches by placing them in a boiling water bath for three minutes.

If lye-peeled peaches are further heated (as is the case in the canning process), or frozen within ten minutes after removal from the lye bath, the dark ring does not appear. But whether

tory and has been used successfully in three commercial plants:

Sodium hydroxide "lye," 1 part
Water, 10 parts
Temperature, 140° F.
Time, 2 minutes

Wash in running water, then pass through 2% citric acid solution to neutralize excess of alkali and to retard browning.

Peaches peeled in this way preserve their natural color in detail even at the very surface, and there is no evidence, by taste or otherwise, that the freshness of the peach is impaired. This is the most satisfactory method of peeling peaches for freezing that has been reported.

Peaches of the Belle variety and split-seeded peaches of other varieties will sometimes turn dark blue near the seed, due to the entrance of alkali into the pit cavity and reacting with acid around the seed.

From eight to twelve per cent of the total weight of a lot of peaches is lost in the process of peeling, either by hand or with lye.

Pitting Peaches

Pitting is a laborious task for which no satisfactory mechanical method has yet been found. From six to ten per cent of the total weight of the fruit is discarded in removing the pits, which constitutes the second most important operation at the freezing plant. Pitting not only necessitates that each peach be handled separately, but that it be turned in the hand from two to four times. All of the commercial varieties grown in Georgia are freestone and are pitted more easily than clingstone varieties.

If a peach has no defect at the seed and has been perfectly peeled and washed, pitting consists merely of girdling to the seed with a knife, pulling the halves apart and lifting the seed out with the point of the knife. But usually there are small bruised spots, unpeeled spots, green areas or other imperfections that should be removed by the pitter.

Thus the pitter is not only a remover of the pits but a grader as well. The pitter determines just what goes into the slicer and subsequently into the containers; what is to go into pulp; what will be the primary product and what the by-product. Obviously the profits of the plant are to a great extent in the hands of the pitter.

Pitting should not only be done efficiently but rapidly to reduce to a mini-

mum the amount of browning. Peaches are usually warm from the lye bath when they reach the pitter. This is especially favorable for surface browning. About half of the time consumed in the passage of the peaches from the lye peeler to the container is while they are in the pitter's pan.

Slicing Peaches

Slicing is a mechanical job that can be done more uniformly by machine than by hand. The machine may be merely several knife blades set in a certain position and the halves of peaches mechanically pushed against them. It may be a double-bladed knife held in the hand, or it may be a power-driven machine with disk knives.

To have pieces that will lie close in the container each half should be cut into five or six longitudinal slices. Several small pieces in a small container give the appearance of more quantity than one or two large slices.

Filling the Containers

The types of containers, the condition of the fruit and the manner in which the fruit is to be served determine how it should be placed in the containers.

If timed cans are used, mechanical fillers can be satisfactorily used. Filling, siruping and capping can be done by such machinery as is now being used by canneries. Mechanical fillers with special adjustments might also be used for paper board or glass containers. Capping should be done by machines especially made for the containers.

If the fruit is to be served frozen, the shape and position of the pieces in the container need not be given the care that they would receive if they are to be completely defrosted and served.

Peaches to be slow frozen, sharp frozen or quick frozen are sliced and the pieces placed as closely together as possible in the containers. Usually a one-ounce container will hold twelve ounces of peaches and four ounces of thirty-five per cent sirup. This gives one and four-tenths of dry sugar per pound of frozen product, or a sugar-peach ratio of 1:8.5.

The most important fact about instant freezing is that the slices of peaches are frozen before being placed in containers. Slices drop directly from the slicer onto a metal belt which immediately exposes them to a temperature ranging from minus 80 to minus

(Concluded on Opposite Page)

More To Come

THE first of a series of booklets on "Preserving Fruits by Freezing" has just been issued by the Georgia Experiment Station. It is written by J. G. Woodroof, and deals with the freezing of peaches. Other booklets will be issued later describing the effects of freezing on other fruits.

On this page is reprinted that portion of the new bulletin which tells of the preparation of the fruit before freezing, and lists the varieties of peach which have proved most suitable for preservation in that manner.

That portion of the booklet which discusses the efficiency of the various forms of containers tried out at the Georgia Experiment Station will be printed in the next issue of the Refrigerated Food section.

An attractive feature of Mr. Woodroof's booklet is the inclusion of several colored plates showing the effect of freezing on certain varieties of fruit. These colored reproductions were prepared from paintings by Mrs. Woodroof.

the brown ring does or does not appear the semi-cooked taste remains, and is objectionable in frozen peaches.

Chemically, this brown ring is much more stable than the brown color which develops on the surface of hand-peeled peaches. It is not broken down and removed by treating with 2 per cent citric acid or 0.005 per cent acetic acid. Boiling for five minutes or freezing prevents further development but does not remove that which has already developed.

The following facts were accumulated and used as a basis for improving or developing a satisfactory method for peeling peaches on a commercial scale:

(1) It is the temperature of the bath rather than the length of treatment or strength of the lye solution that is objectionable. (2) Any solution when raised to a temperature above 140° F. (60° C.) will cook peach tissue even though treated for only one-half minute. (3) If the temperature of the bath is kept below 140° F. the strength of the solution can be increased to 10 per cent and the time of treatment extended to five minutes, with no evidence of cooking the surface of the peach; and this treatment completely and satisfactorily removes the peel from the peaches. (4) It is very difficult to remove by washing with water all of the lye from the surface of soft ripe peaches without bruising them.

The following formula for peeling peaches was worked out in the laboratory.

"AN ADDRESS OF DISTINCTION"

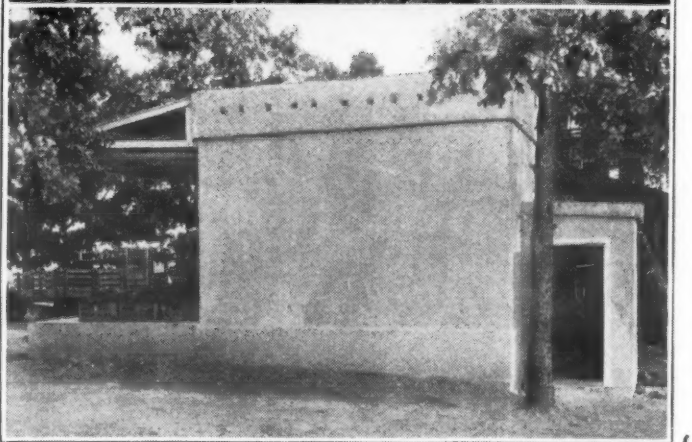


Special Advantages for "Big Game" Visitors

FANS visiting Chicago for the big football games will find THE DRAKE location unusually convenient. All playing fields are easily reached. After the game... there's gaiety... or quiet... as you prefer. A smart Supper Dance... the rhythmic tunes of a famed Orchestra. No rate advance. Rooms begin at \$5 per day.

THE
DRAKE
HOTEL, CHICAGO
Under Blackstone Management

Cooling Helps Farm Products



Atlanta, Ga.—R. F. Sams, Jr., who runs a model truck farm near Atlanta, this past spring was sold on the idea of using electric refrigeration to enable him to market his truck products so as to obtain the very highest market prices. The equipment sold Mr. Sams has already paid for itself in one season, and he finds it has proved to be very economical and has allowed him to carry on some very valuable experiments that will prove helpful to the other farmers of the state. He has found that tomatoes will ripen better in a room of approximately 70 degrees than they will in the field, and has been using one of his boxes for this purpose during the tomato season.

Leafy vegetables such as spinach, carrots, etc., were found to keep better at a temperature between 50 and 55 degrees with a relatively high humidity, and that berries such as raspberries and strawberries need dry atmosphere with a temperature of between 35 and 40 de-

grees. During the berry season, one of the boxes was used for berries exclusively.

The equipment furnished on this job was a two-ton Baker ammonia machine. One box, 12' x 12' x 8' high and one box 8' x 8' x 8' high. The larger box is thermostatically-controlled, while the smaller box is hand-operated. The boxes are built of hollow tile and are lined with 4 in. of sheet cork. The floors are 4-in. concrete, with drains in the center, and 1 in. plastered ceilings and side walls. The coils are mounted on three sides of the walls and are protected by wooden grating on side walls and floor so as to allow maximum amount of circulation in both rooms. An excessive amount of coil is used so as to keep the frosting of the coils down to a minimum. The machine is set on a defrosting cycle.

By using spring water to cool the compressor, the cooling water draining into an irrigation ditch. The cost of operation is an average of \$30.00 per month.

Thesco Refrigerator
Display Counter
No. 2700. One of
a complete
line



Beauty... Plus Practicality

Merchants today realize that their fixtures must please the eye, but, at the same time, that this beauty must not be obtained through sacrifice of practicality. The Thesco Refrigerator Display Counter shown above combines attractiveness with economic usefulness—It is the ideal display counter.

DISTRIBUTORS: At present there are some very attractive territories open to Thesco representation. Write for complete proposition, literature, catalogs, and discount arrangement.

THE C. SCHMIDT CO.

JOHN AND LIVINGSTON AVENUE

CINCINNATI, OHIO

PREPARATION

Of Peaches for Freezing

(Concluded from Opposite Page)

100 degrees F. The frozen slices are mechanically removed from the belt and placed in containers. Chilled syrup is added.

Dry Sugar vs. Sugar Syrup

The sweetening of frozen peaches is one of the important technical problems. Dry sugar and sugar syrup are used. Sugar syrup differs from dry sugar only in that water is added. The use of dry sugar results in a more concentrated solution and forms really a juice syrup.

The preservative power of sugar increases with an increase in concentration. Sugar being a food, adds to the food value of the product. However, above or below certain concentrations it tends to damage the structure of the peach tissue. The freezing point of the solution is lowered very rapidly as the concentration increases.

Peach tissue freezes at about 28.3° F. and has no osmotic pressure and freezing point similar to a 30 per cent sugar syrup solution. From 28 to 38 per cent sugar syrup solution produces least change in the physical condition of the peach tissue. Above this range the syrup plasmolyzes the tissue, causing it to shrink, lose volume, become wilted and limp. It also lowers the freezing point of the product. Below this range the tissue swells, becomes soggy, loses its fresh color and breaks down. Though various strengths of syrup were poured over peaches and frozen, it was found that on defrosting the percentage of sugar in the various solutions had been altered in strength as follows: 56% to 42%; 50.6% to 35%; 45.7% to 31.5%; 40% to 29%; 34% to 25%; 28% to 21%; 20% to 16%; 17% to 14%; 14% to 13%; 8% to 9.5%; 3.2% to 6.5%.

When one part sugar and five parts peaches were mixed the volume of the mass of peaches began to decrease and the volume of the liquid began to increase. On standing one hour (the time required for freezing) the peaches lost 13.2 per cent of their original weight and 20 per cent of their original volume. At the same time juice was removed from the peaches until the container was 80 per cent filled. This amount of juice was just sufficient to completely cover the shrunken peaches. Peaches that were in contact with a saturated sugar solution were noticeably shriveled, shrunken and tough.

When a 35 per cent solution was poured over fresh peaches the syrup was reduced slightly in specific gravity, due to dilution from added peach juice, but the peaches remained crisp, fresh and like the original in color, appearance, texture and taste. Also the rate of freezing or defrosting was very nearly at the same rate within the peach tissue as in the syrup.

While much work has been done on this problem, and much more is contemplated, our results thus far seem to warrant a recommendation of a complete coverage of peaches with 30 to 35 per cent sugar syrup.

Joslyn and Cruess, Joslyn, Diehl, and Woodroof have found that a more satisfactory product is obtained when syrup rather than dry sugar is used. The advantages are as follows:

Joslyn and Cruess, Joslyn, Diehl, and Woodroof have found that a more satisfactory product is obtained when syrup rather than dry sugar is used. The advantages are as follows:

- (1) There is little or no change in fruit volume.
- (2) There is little or no change in juice volume.
- (3) The osmotic pressure of the syrup is near that of the peach juice.
- (4) The freezing point of the syrup is nearer that of the peach tissue.
- (5) The syrup is a better aid to preserving the color and texture on freezing and defrosting.
- (6) It is easier to get a uniform distribution and coverage of syrup than of sugar.
- (7) A more attractive pack is obtained by the elimination of air holes in the pack. Pockets of air within a container will cause a brown discoloration to develop around them.
- (8) The use of pre-chilled syrup assures a more rapid rate of cooling of the fruit than in the sugar pack.

Diehl et al state that berries frozen with dry sugar lose water and shrink in proportion to the concentration of sugar used. The decrease in size seems to occur soon after the fruit is packed.

Varieties of Peaches for Freezing

Several years will be required for the consuming public to express itself as to what variety or group of varieties is most favored. In the meantime all of the better varieties that are usually sold fresh are being frozen. Many of the qualities which are desired in fresh peaches are also desired in frozen peaches, and there appears to be no immediate demand for a change of va-

rieties to meet the needs of freezing plants.

The following points are in favor of the Elberta and Hale varieties: (a) Yellow flesh peaches are in greater demand on the fresh market than white flesh peaches. (b) Yellow flesh peaches are more desirable for canning than white flesh peaches. (c) Yellow flesh peaches do not show the brown discoloration due to oxidation as readily as peaches with white flesh. (d) The quality of these varieties is very high.

Peaches for freezing should have the following qualities: (a) Uniform ripening; (b) free stone; (c) yellow flesh; (d) the flesh must have "body" so as not to disintegrate on defrosting; (e) capable of being produced in large quantities; (f) capable of undergoing considerable bruising without breaking the skin; (g) good quality.

It will be interesting to observe during the next few years whether such canning and drying varieties of the Pacific Coast as the Tuscan, Philip, Sims, Walton, and Palora, will be more or less favored as frozen peaches than Georgia varieties which are especially popular when eaten fresh as the Hiley, Belle, Elberta, and Hale. Early Georgia varieties, the Early Rose, Uneceda, Red Bird, and Carman, as well as varieties of the honey group, Florida Gem, Honey, Luttichan, do not show promise of becoming commercially profitable for freezing.

GEORGIANS

(Concluded from Page 1, Column 1)

ogy and physics. It is into this field that the Georgia Experiment Station is entering. Accumulating and disseminating basic facts is our exclusive mission in the frozen fruit game. We believe that we can be an aid to many and an offense to none by collecting and spreading such facts with no monetary gain to ourselves.

"Of the 14 kinds and 48 varieties of fruits which we have frozen during the past year no general statement can be made with regard to all of them. The concentration of sugar syrup most suitable for strawberries is too strong for peaches and raspberries. The most satisfactory temperature for peaches and strawberries is not best suited for figs. From our experience, it appears that the following fruit has been successfully preserved by freezing: strawberries, raspberries, peaches, pears, figs, Young dewberries, while blackberries, blueberries, huckleberries and grapes do not appear as suitable for freezing. A great deal is expected of frozen fruits and some fruits do not reach the height of perfection that is expected. The first three of these are objectionable due to seediness of the frozen pack; also grapes are objectionable due to the presence of both seed and skin. The varieties of fruits and vegetables are listed in the order of their preference. It will be readily seen that there is a definite order in which varieties should be listed. There is as much difference between the adaptability of different varieties of the same fruit of freezing as there is between different fruits.

"Of the eight kinds and eleven varieties of vegetables frozen, peas, string beans and lima beans appear to be best adapted. Cantaloupes and tomatoes have been only partially preserved in their natural condition by freezing, while watermelon, asparagus and radishes appear not to be well adapted to freezing.

Juices

"All of the 18 varieties of grapes from which the juice has been extracted and frozen appear well adapted for this method of preservation. Some of the juices are much better than others, but it does appear that the seed and skin should be separated from the juice and pulp and only the juice and pulp should be frozen.

Solution

"Of the several dozen kinds of solution in which we have placed vegetables and fruits for freezing it appears that these vegetables are best preserved in a one to two per cent brine solution and fruits in a syrup solution ranging from 30 to 50 per cent sugar. The particular concentration of sugar depends on the freezing point of the juice of the fruit, the osmotic pressure of the juice of the fruit and the amount of sweetness which is desired to add to the fruit. We believe that the freezing point and osmotic point of the syrup added should not vary a great deal from the freezing point of the osmotic pressure of the juice of the fruit.

Containers

"We have used during the past season 32 kinds and sizes of containers for frozen fruits and vegetables, varying from 24 ounces to 2 ounces capacity. These include four brands of paperboard containers, three brands of glass containers, one brand of tin containers, one brand of aluminum containers, and three brands of wrapping material.

"From 1910 until 1929 the size of containers for frozen fruits evolved from fifty gallons to one pint. During 1930 the size has been reduced to from two to four ounces capacity. The most pop-

ular size container at present is an individual serving of 2, 3 or 4 ounces, depending on the concentration or richness of the product being served. Four ounces of peaches, cantaloupe and diluted juices constitute a serving; three ounces of figs, strawberries, blackberries, Young dewberries, combination salads, and combination desserts; and two ounces of undiluted juices constitutes a popular serving.

"Beautifully labeled paper board cartons are the most popular containers at present. They are non-breakable, sanitary, easily handled, and may be used as serving dishes. Glass containers have the advantages that they show the actual product rather than a picture of it, and they may be vacuumized. However, they are more expensive and subject to breaking in handling, while practically none of them break due to expansion during freezing. It appears that much of the better quality frozen products will be packed in glass under vacuum. Tin containers have strength, can be vacuumized, and have a high conductivity; advantages which are shared with aluminum containers, and in part with glass containers.

"We have used Cellophane, aluminum foil and vegetable parchment for wrapping 3-ounce blocks of frozen fruit. This method of preparing frozen fruits could be made very popular to the 5 and 10 cents trade. The wrapping material is cheap and the operation of freezing and wrapping the blocks can be done very rapidly by mechanical means. The wrapper should completely cover the block of frozen fruit and sealed on the ends and edge. The label may be printed on the wrapper or printed on the sticker which is later pasted on the wrapped package.

"Readily oxidizable fruits, such as peaches, pears, nectarines, are not suitable for freezing in blocks and wrapping because of the large amount of exposure to air. However, if these small blocks

are tightly placed in a larger vacuumized tin container, the results will be very satisfactory."

At the conclusion of Mr. Woodroof's report there was a general discussion of a number of the points brought up by him. The suitability of the various sorts of containers proved a lively topic. The problem of shipping and handling to the consumer was discussed, and the general opinion seemed to be that satisfactory progress is being made. Those present at the meeting, in addition to those identified with the Station, were:

Lovelace Eve, State Department of Agriculture; R. W. Cammack, agricultural agent, S. A. L. Ry., Atlanta, Ga.; E. S. Center, Jr., general agricultural agent, Ga. A. W. P. R., Atlanta, Ga.; Albert W. Luhrs, chief engineer, Paperboard Industries Assn., 300 Fourth Ave., New York; P. M. LaFrance, chemist, American Can Co., Maywood, Ill.; Norman J. Willett, chemist, American Can Co., Oak Park, Ill.; R. Brooks Brown, Jr., manager Atlanta Office, Anchor Cap and Closure Corp., Atlanta, Georgia; J. F. Jackson, general agricultural agent, Central of Georgia Ry., Savannah, Ga.; C. T. Baker, consulting engineer, Walton Bldg., Atlanta, Ga.; Frank T. Breidigam, chemist, Libby, McNeill & Libby, Chicago, Ill.; J. D. Malcolmson, manager Research Engineering Dept., Robert Gair Co., New York; W. W. Ballscom, Jr., Orange Belt Packing Co., Eustis, Fla.; O. J. Willoughby, publisher, Refrigeration, Atlanta, Ga.; Arthur B. Hale, engineer, Florida Citrus Exchange, Tampa, Fla.; J. D. Diamond, local sales manager, American Can Co., Atlanta, Ga.; Walter L. Graefe, president Pomona Products Co., Griffin, Ga.; C. V. Griffin, secretary-treasurer, Orange Belt Packing Co., Eustis, Fla.; W. A. Crawford, editor, Central of Georgia Magazine, Savannah, Ga.; Geo. E. Murrell, horticulturist, Southern Railway Development Service, Washington, D. C.; Seth S. Walker, consulting chemist, Florida Citrus Exchange, Tampa, Fla.; N. W. Cruger, Southern rep., Paterson Parchment Paper Co., Passaic, N. J.; Thos. A. Schilling, Southern division sales manager, Lily Tulip Cup Corp., New York; Dr. E. G. Ballenger, Atlanta, Georgia; C. M. Foster, Pres, Polar Products, Inc.,

Atlanta, Georgia; C. B. Gray, sales engineer, Sprague Sells Corp., Baltimore Md.; V. O. Bodenheimer, district manager, Mono Service Co., Newark, N. J.; Claude Clemon, Tampa Union Terminal, Tampa, Florida; Geo. Braungart, Jr., manager, York Ice Machinery Co., Atlanta, Ga.; Paul J. Pravast, Aluminum Company, Atlanta, Georgia; F. L. Magee, district manager, Aluminum Co. of Amer., Atlanta, Ga.; T. J. Purdy, Griffin, Georgia; O. F. Benz, DuPont Cellophane Co., New York City; W. I. Hudson, Jr., Standard Printing Co., Columbus, Georgia; John H. Cheatham, president Ga. Kincaid Mills, Griffin, Georgia.

APPLES

And Pears Start Long Journeys

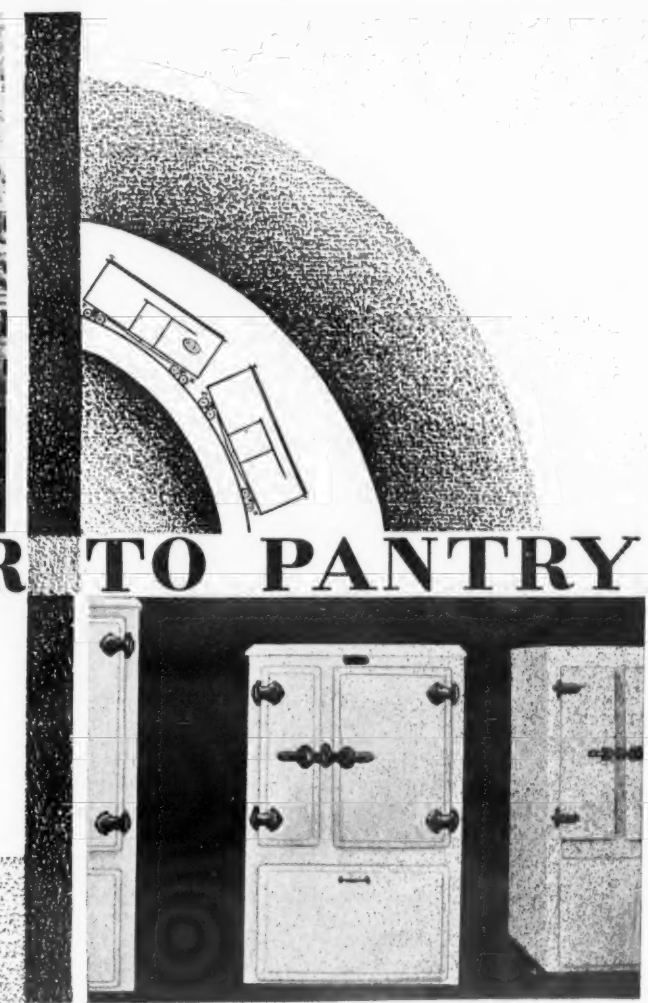
Seattle, Wash.—First of the huge cargoes of apples and pears from Washington orchards to be shipped around the world calls for the reservation of many refrigerator ships. Chartering of the first refrigerator ships began in October, with the addition of other vessels to transport part of the \$40,000,000 crop. Refrigeration will keep the fruits in the best possible condition.

One hundred and sixty-three carloads of apples and pears was the cargo of the British S. S. Gaelic Star, fully refrigerated and loaded in Seattle. Further bookings include the reservation of the full refrigerator ship Norman Star, to load November 12 for Hamburg, Rotterdam and Newcastle. The Gaelic Star loaded for South American ports. The refrigerator ship Edda will load November 15 for Rotterdam and Hamburg, and will take 140,000 boxes of apples to those ports. The refrigerator ship Malmoe will carry a load to London and Liverpool. Other refrigerator ships will include the Pardo and the Parana, for Europe; the Cornalido of the Donaldson Line, and the Elstree Grange of the Furness Line for England, Scotland, Holland and Germany.



FROM PACKER TO PANTRY

Corkboard Protects Frozen Foods



In huge packing plants, foods are frozen at polar temperatures. Transported by refrigerator cars and trucks to retail stores, they finally reach the household—guaranteed at every step by corkboard.

FROM freezer room to consumer, insulation plays a vital part. Packing plants, storage rooms, refrigerator cars, refrigerated trucks and dealer display cases—all need efficient insulation to insure successful manufacture, transportation and distribution of quick-frozen products.

Already the great packing companies have started to alter their plants. But changes must be made all along the line if mass distribution is to be achieved. The challenge of quick-frozen products must be met with up-to-date equipment—with adequate insulation. Which means corkboard insulation! For corkboard has proved its value

as the standard insulation of the cold storage industry for more than a quarter of a century.

To help you get the most modern refrigeration equipment Armstrong has organized a Frozen Foods Development Committee. This Committee is studying the various phases of insulation. Many research tests are being conducted with the aid of experienced engineers. The Committee wants to help you with your problems. If you have any insulation difficulties, just write to the Frozen

Foods Development Committee, Armstrong Cork & Insulation Company, 917 Concord Street, Lancaster, Pennsylvania.

Armstrong's Corkboard Insulation

The Standard Insulation for All Refrigeration

FRIGIDAIRE

Introduces New Ice Cream Cabinets at Dairy Show

Cleveland, Ohio.—A new line of Frigidaire ice cream cabinets, priced lower than before, designed to increase efficiency and lower the cost of operation, was presented to the ice cream industry at the Thirtieth Annual Convention of the International Association of Ice Cream Manufacturers, at Cleveland, O., October 20 to 25. B. J. Vandoren, commercial sales manager, headed the Frigidaire delegation at the show, and was in general charge of the display.

Thirteen models of cabinets, in sizes for the smallest and largest retailer of ice cream, were displayed as the 1931 line of Frigidaire in this field. In addition, Frigidaire announced an ice cream delivery truck refrigerating unit. Improvements in the ice cream cabinet line include more efficient and larger capacity compressors, more efficient cooling coils, thicker insulation, improved lids, and the addition of square sleeves to care for the rapidly increasing sales of package and brick ice cream.

Condensers are now of the cross-finned, radiator type. A forced air draft is used for speedy dissipation of heat. The compressors have automatic belt tighteners and spring suspensions. Cooling coils have been improved.

Improved Construction

Tops of the new Frigidaire cabinets have a layer of stainless bright metal backed by a sheet of steel, making it possible to provide thicker top insulation. Lids have an external collar of hard rubber enclosing a thick disc of insulation. Tops and bottoms are of stainless bright metal. Flexible rubber sealing rings are vulcanized to the upper part of the collar. The Frigidaire Cold Control, which was added to the ice cream cabinet line last year, has been retained.

Two combination cabinets for ice cream and bottled beverages, designed for dealers whose business does not justify two pieces of equipment, are among the thirteen models in the ice cream cabinet line. One is a two-hole type, with one square and one round sleeve and a storage compartment 20½ in. long, 21½ in. high, and 12 in. wide. It has a capacity for 50 six-ounce bottles. The other model is a four-hole type, with two round and two square sleeves and a storage compartment 20½ by 21½ by 22½ in. Its capacity is 110 six-ounce bottles.

The thirteen models are in sizes ranging from two to twelve holes, and are finished in black enamel baked on steel panels, and have tops of stainless bright steel.

Truck Refrigerating Unit

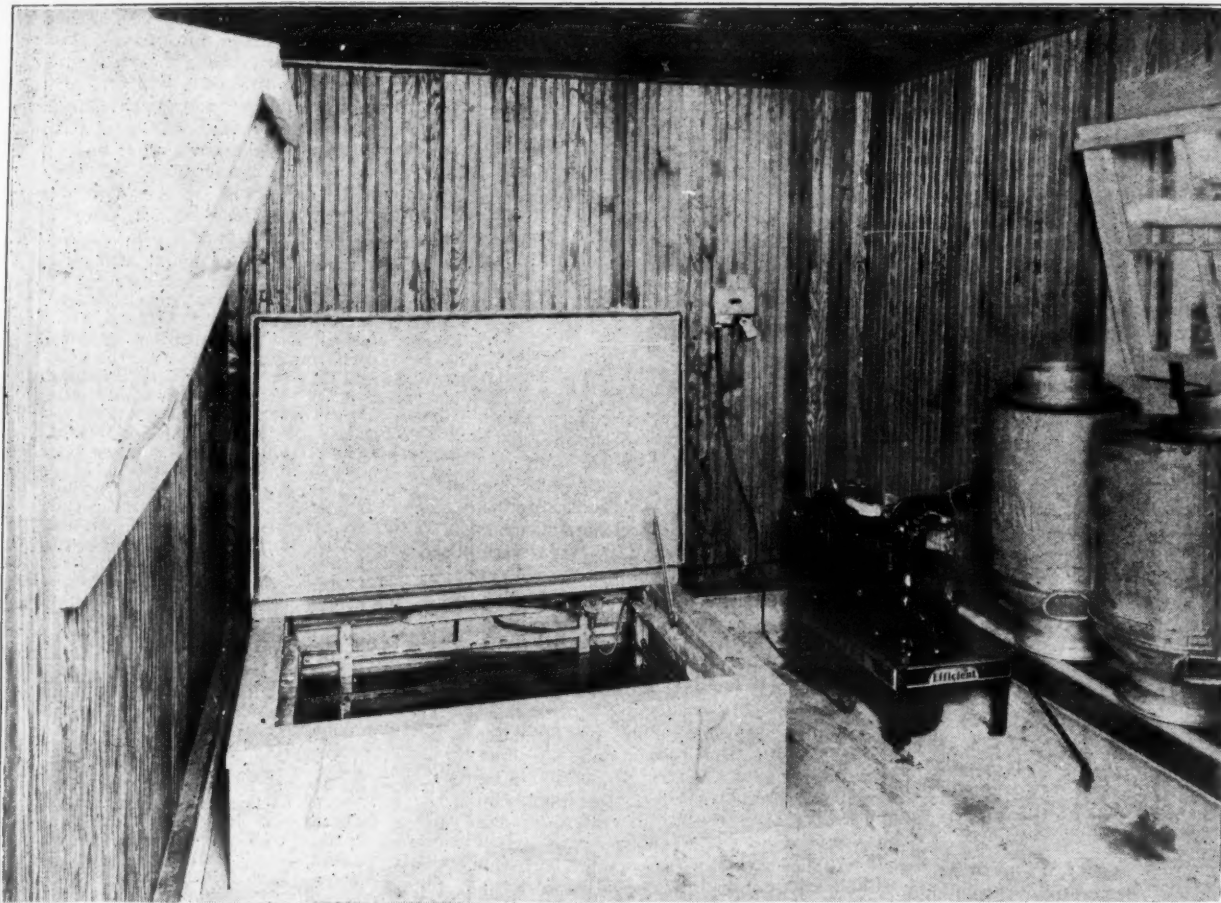
The new Frigidaire truck refrigerating unit is self-contained and can be used in either a truck or a trailer. It is adapted for any ice cream delivery vehicle (large or small) and will maintain extremely low temperatures.

This unit does not depend upon the automotive mechanism of the truck for operation. It is powered by a directly connected six horsepower, heavy duty Novo gasoline engine. The Frigidaire compressor has two cylinders. A direct expansion refrigerating system is employed and the refrigerant is circulated through a series of pipes at the roof of the truck or trailer.

The system is operated manually, the operator starting the gasoline engine when refrigeration is needed, making a sturdy assembly to stand up under the severe jars and shocks of road travel. Both compressor and gasoline engines have their own fans driven from the gasoline engine shaft. These fans pull in a volume of fresh air over the compressor condenser and push the air out through the engine radiator.

A two and three-quarter gallon gasoline tank and a Chevrolet automobile muffler are standard equipment. The entire unit is mounted on a rigid steel base.

Modern Methods in Central New York



Copeland-Victor installation by the B. I. Cooper Sales Co., Syracuse, N. Y.

LIPMAN

Beloit, Wis.—The new Lipman line of full automatic commercial refrigerating machines produced by the General Refrigeration Co. has twelve models, with ratings from ½ to 40 horsepower. All of these models are of compact construction, the entire assembly fitting on a rigid semi-steel base.

All Lipman machines are designed for full automatic operation, although manual control is optional. In automatic operation, a thermostat, set at the desired temperature, operates the motor control, which starts and stops the machine. Temperatures are maintained to within two degrees. Water for condensing the gas and cooling the compressor is supplied by an ammonia pressure actuated water valve, which admits exactly the amount of water needed and no more. Should the water supply fail, the machine stops itself. Should the pressure rise a little above normal, the machine stops. Then, when conditions are again normal, the machine starts up without any attention on the part of anyone.

HARTFORD ELKS GO IN FOR REFRIGERATION

Hartford, Conn. — Newton-Parsons Company, 123 Ann Street, has installed a standard G. E. milk cooler in the Hartford Elks Club building. The equipment is to be used as a beverage cooler.

A 45 cu. ft. Seeger cabinet, with ½ h. p. G. E. unit, has been placed in the Avon Diner, Avon. The Asylum Hill Market, Asylum Street, has been supplied with a G-450 refrigerator, with ½ h. p. unit, according to L. H. Weber, commercial manager.

QUENCHING THE THIRST OF MICHIGAN PHONE GIRLS

Detroit.—Operators in seven Michigan Bell Telephone Company Exchanges quench their thirst at Copeland cooled fountains. According to Ralph Graham, Copeland equipment is installed in the Hogarth, University, Niagara and Pingree Exchanges in this city, and in Central Offices at Holland, Grand Haven and Port Huron, Michigan. A new building, located at Fort and Wheelock

Streets, which is nearing completion, will be similarly equipped.

The cooling equipment in each case consists of Spear ice water generator, together with a Copeland condensing unit. All this equipment, Graham stated, has been sold during the present year.

MUNCIE

Muncie, Ind.—Two grades of Sally Lee Frigid Meats are now on sale here in the stores selected by the Indianapolis Abattoir, Inc., for its test campaign. Extra fine and standard grades are now available. The addition of a second grade is expected to widen the possible market and bring the quick-frozen meats within a price range that will give many more Muncie housewives a chance to get acquainted with the new products without spending more than they are accustomed to.

Sales are keeping up well and there is every indication that the experimental campaign is viewed as a success, carrying with it a promise of future expansion either here or elsewhere.

DETROIT COMPANY TO PRODUCE SOLID CO₂

Detroit, Mich. — Establishment of a \$400,000 solid carbon dioxide plant in Detroit, the first of its kind to be acquired in this city, was announced recently by Nathan Borin, president of Borin Brothers Coal & Ice Co. The new plant is to be located at Linwood Avenue and the Pennsylvania railroad and will have an initial capacity of 30,000 pounds daily.

Construction is to start at once and equipment will be ready to install the moment the structure progresses to a point where it will receive the machinery.

SAFETY

San Antonio, Tex.—The San Antonio mechanical refrigeration distributors, together with the San Antonio Light, sponsored a Food Preservation Week, September 28 to October 4, to impress upon the public the importance of the correct preservation of foods, especially in tropical and semi-tropical climates.

The week was opened with a special section carried in the Light in which many makes of mechanical refrigeration and auxiliary products were represented. Considerable space was given to editorial matter on food storage, preservation and temperatures.

The event was timed to take place during the first cool spell of the season; a time when negligence causes much waste of food and much illness through improper care.

Displays tied up with the newspaper copy did much to contribute to the success of the event.

CHAIN STORES INSTALL YORK EQUIPMENT

New Haven, Conn.—York Ice Machinery Corporation has installed new equipment in two Atlantic & Pacific Tea Company stores in the Connecticut territory. The installations were in stores at 35 East Grand Avenue, New Haven, and 188 Main Street, Ansonia. A 5 ft. 11 in. meat case and 3 ft. 3 in. butter case were placed in each store by the Chadwick & Carr Company, Boston, Mass.

HILL INSTALLATION

Baltimore, Md.—Hill Dry Cold equipment has been installed in the new combined delicatessen, bakery and restaurant opened at Charles and Biddle Streets, Baltimore, Md., by Fred Gloth.

ST. LOUIS

Dairy Show Has Many Large Refrigeration Displays

St. Louis, Mo.—Cows and milking machines were the most prominent displays at the National Dairy Show held here October 11 to 19, but refrigeration was not eclipsed. Electric refrigerators were so well displayed that visitors at the show could scarcely fail to learn what is latest in refrigeration. And all representatives reported that they found people much interested.

The Del-Home Light Company, St. Louis, Frigidaire distributors, had a large display, including models AP 4, 5, 6, 7-1, 7-2, 9, 12, 18; MC 9, 12; and G 3, 4, 5 and 6. Two water coolers and two motors in operation were shown.

Four Kelvinator models were displayed by the Union Electric Company, St. Louis, together with other electrical merchandise distributed by the company. The display included the D-9, D-11, Yukon, and Special 11, Seeger two-door cabinet, Kelvinator equipped.

James & Company, Inc., St. Louis, distributors of General Electric refrigerators, displayed eight domestic models, two commercial models, an ice-making machine, a biological refrigerator, two water coolers, and an ice cream cabinet, and the 90-cube all-steel domestic model. The two commercial models, fitted with glass, had been stocked with food, illustrating the correct placing, by a leading local grocery concern. A small motion picture machine gave descriptions of the refrigerator, slogans of the company, and showed the testing of the General Electric refrigerator by blasting with sand and forming a sheet of ice over the exterior of the refrigerator.

Frigidaire Corporation, Dayton, had a display in addition to the exhibit by the St. Louis distributor. Three domestic and one commercial model refrigerators were shown against black velvet drops decorated with silver. A milk cooler, an ice cream cabinet and cold storage cabinet combined, a four-hole ice cream cooler, a milk cooler and a compressor completed the exhibit.

The Century Electric Company, St. Louis, included two refrigeration motors in its display. The M7, new on the market, with rubber base and springs to promote silent action, and equipped for different voltage, was the feature.

Included with heating equipment, the International Heating Company, St. Louis, displayed a four cubic foot and a six cubic foot model refrigerator.

One domestic model was exhibited by the Sears-Roebuck Retail Stores.

Among companies using refrigerators in their exhibits was the Pet Milk Corporation, St. Louis, who used a Frigidaire. Pevely Dairy Co., St. Louis, refrigerated models in butter in a Hussman show case, Frigidaire equipped. An exhibit of prize winning butter and cheese of the United States and Canada, and a large moulding in butter of a cow, calf and boy, by the Sugar Creek Creamery Company, St. Louis, were refrigerated by a Frick unit installed by R. H. Tait & Sons, Inc., St. Louis, refrigerating engineers.

MILK COOLERS

Mt. Clemens, Mich.—Recognizing that most dairymen employ home-made concrete vats for cooling milk, Copeland Sales Company engineers made a study to determine the best type of vat construction for use with electric refrigeration. The subject of remodeling present vats to accommodate electric refrigeration was also investigated.

In the report the following method of construction is recommended: Approximately 4 in. of concrete, at least 3 in. of corkboard, properly hydrolined or water-proofed, with all joints lapped and air spaces filled with hydrolene, and an inner lining of at least fourteen gauge waterproofed galvanized iron or an inner lining of 4 in. of concrete. The latter is preferred where new construction permits the additional wall space. An overflow drain should be installed in one corner of the vat. The top of the vat can be finished off with 2-in. oak plank, waterproofed. The cover should be insulated with at least 2 in. of corkboard finished with matched lumber.

Where a farmer has a concrete vat which he is using at present, and the inside dimensions will permit, the installation of at least 3 in. of corkboard, properly hydrolined with all joints lapped, and an inner tank of fourteen gauge galvanized metal is recommended.

In both cases, the following installation procedure is suggested: A rack should be placed at the bottom of the vat to allow the water to contact with the bottom of the cans. Enough tubing to encircle the inside of the tank must be installed and protected by a specially constructed rack. The tubing lengths which are to be used, and also the condensing unit sizes, will vary, according to the number of cans produced in two milkings which are to be cooled.

SUBSCRIPTION ORDER

ELECTRIC REFRIGERATION NEWS
550 MACCABEES BUILDING, DETROIT, MICH.

Please enter subscription to *Electric Refrigeration News*.

United States and Possessions: ☐ \$2.00 per year. ☐ Three years for \$5.00
All other countries: ☐ \$2.25 per year. ☐ Two years for \$4.00

I am enclosing payment in the form of ☐ Check ☐ P. O. Order ☐ Cash

Name

Address

City and State

Cooling Conveyances

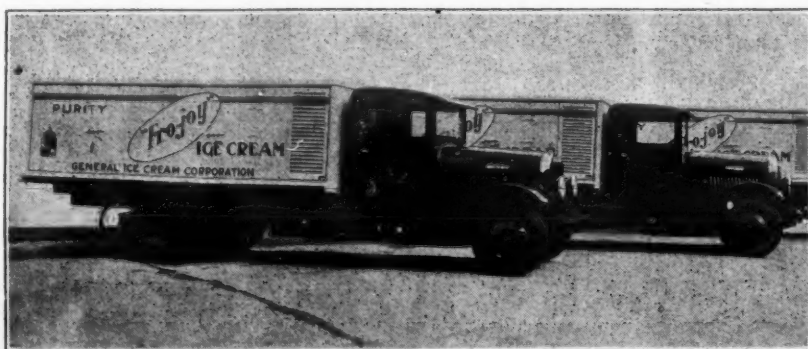
KOHLER electric plants, supplying power for refrigeration on motor trucks, make it possible to transport ice cream, meat, vegetables and other perishables both sanitarily and economically.

These plants, portable four-cylinder engines that operate on gasoline, are sturdy and compact. They are not affected by rough roads, and one of the units, mounted in a corner of a refrigerator truck, requires only a fraction of the space heretofore utilized by the ice compartment.

Kohler electric plants, built in five sizes, of 800 watt and 1½, 2, 5 and 10

K.W. capacities, are available in a total of more than fifty different models. They are manufactured at the Kohler Company's large plant which is located at Kohler, Wisconsin.

Electricity is furnished automatically by the plant. When any refrigerator, light or electrical device drawing power from the unit is turned on, the plant starts and supplies current. It also stops automatically when the last electrical appliance is turned off. Thus no large sets of storage batteries are needed, only a small battery being required for starting.



Trucks equipped with Kohler plants.

ELECTRIC REFRIGERATION NEWS

Registered U. S. Patent Office.

UNIVERSITY OF CALIFORNIA
LIBRARY

The business newspaper of the refrigeration industry

ISSUED EVERY TWO WEEKS OF THE
VOL. 5, No. 4, SERIAL No. 106

Copyright, 1930, by
Business News Pub. Co.

DETROIT, MICHIGAN, OCTOBER 22, 1930

Entered as second class matter
Aug. 1, 1927, at Detroit, Mich.

FIFTEEN CENTS PER COPY
TWO DOLLARS PER YEAR

National Metal Congress Draws Big Crowds of Engineers

Four Technical Societies Join Hands With Scores
of Exhibitors in Gigantic Show

CHICAGO, ILL.—Breaking all records for attendance and sustained enthusiasm, the 1930 National Metal Congress, which convened in the Stevens Hotel here during the week of September 22, attracted more than 6,000 delegates. Four national engineering societies, the American Society for Steel Treating, the American Welding Society, the American Institute of Mining and Metallurgical Engineers, and the American Society of Mechanical Engineers, conducted technical sessions running concurrently with the National Metal Exposition.

Ninety-eight papers were presented to 33 sessions of these groups during the five-day program. Almost 200 exhibitors occupied every available square foot of two Stevens Hotel floors. And throughout the congress both the session rooms and the exhibition floors were crowded to capacity.

High Lights

High lights of the congress included trips to various manufacturing plants; a session on salesmanship, which featured a dramatized lecture on selling by Prof. R. C. Borden and Alvin C. Busse of New York university; the Campbell memorial address, "Oxygen in Steel," delivered by Dr. Marcus A. Grossman of the Republic Steel Corp., Canton, Ohio; the election of John M. Watson, of the Hupp Motor Car Corp., Detroit, as president of the American Society for Steel Treating; the joint session on theoretical metallurgy of the two divisions of the American Institute of Mining and Metallurgical Engineers; and the award of the Henry Marion Howe gold medal to H. J. French, of the International Nickel Co., Bayonne, N. J., for his paper, "A Study of the Quenching of Steel."

Among the subjects given especial attention were the nitriding process, tungsten carbide, heat treatment and forging, and stainless steel.

More than 600 A. S. S. T. members and visitors attended the first session on salesmanship ever held by the society. Donald B. Clark, of the Firth-Sterling Steel Co., McKeesport, Pennsylvania, was chairman of this novel program.

Humorous Dialogues

The two New York university colleagues presented humorous dialogues portraying a pair of congressmen conversing (illustrating a poor sales talk), a conference between the president and sales manager of a furniture company (illustrating the adverse influence of digression), and a half dozen similar situations demonstrating the application of as many sales principles.

Dr. Marcus A. Grossman, who delivered the fifth annual Campbell memorial lecture, met with spontaneous acclaim as a result of his dissertation on the effects and analysis of oxygen in steel. He illustrated his lecture with lantern slides.

Giving special reference to the Jordan vacuum fusion method, Dr. Grossman considered analytical methods for determining the amount of oxygen in steel. He also discussed the effects of oxygen

(Concluded on Page 4, Column 5)

Refrigeration Men Good Customers, Says Wulf

Detroit, Mich.—Refrigeration manufacturers present an excellent market for metal products, according to William Wulf, distributor of steel, forge, and foundry products made by the Lindell Drop Forge Co., Lansing, Mich.

"For many years we have sold such parts as crankshafts, connecting rods, and miscellaneous steel forgings used in the construction of refrigerators to manufacturers of these products," says Mr. Wulf.

"These forgings are made from either carbon steel or alloy steel. Electric refrigeration companies are among our best customers, and place repeatedly larger orders with us."

CHICAGOANS SEE STAINLESS STEEL ROADSTER

Chicago, Ill.—Motorists and pedestrians of this city have been startled recently by an apparition, a shining metal monster on wheels. This novel automobile is a Chrysler 77 roadster belonging to the Rustless Iron Corp., New York City, and its exterior is made largely of polished corrosion-resisting steel.

The hood, radiator, fenders, fender brackets, side apron, headlamps, cowl lamps, windshield frame, windshield wiper, instrument panel, door handles, gasoline tank cover, wheel hubs and spokes, and smaller parts are made from rustless iron.

A low-carbon steel containing 16-18 per cent chromium, but no nickel, comprises the material used in this job. Surprisingly enough, this steel does not

glare when it is polished, although it has a beautiful lustre.

All of the parts were made and polished in the Chrysler factory at Detroit. The steel used was of the same gauge as standard parts.

NEW INDUSTRY REQUIRES ITS COPPER TUBING MADE JUST SO

Providence, R. I.—"Copper tubing is a vital and important component of electrical refrigerators," states H. W. Dittmeyer, sales manager of the United Wire & Supply Co., of this city, "and as such it creates a large new market for firms which can make this tubing according to rigid specifications."

Among the customers of this company is the refrigeration division of the General Electric Co.

Coming

Traveling from the realm of the dealer and distributor to the manufacturers' bailiwick, the current "pink section" deals with metals and their application to refrigeration.

Although the appeal is primarily to the manufacturer, the man who is selling should find that perusal of this issue will enlarge his background, and help him make a more intelligent sales presentation.

Similar appeal will be carried by the next Buyer's Guide section, which will be devoted to production and service tools.

Refrigeration Field Offers Excellent Market for Metal Products

Progressive, Growing Industry Eager to Improve
Models; Heavy Buyer of Materials

AN electric refrigerator is essentially a metal product. Steel cabinets, iron castings, copper and brass valves, fittings and tubing, nickel, chromium, stainless steel, and other lustrous metals for hardware and trimmings—the list reads on and on. Refrigeration engineers, striving constantly to improve their products, are continually on

the lookout to find metals which are better adapted to the stresses and strains peculiar to a refrigerating mechanism.

Manufacturers of metal products now used by the electric refrigeration industry are keenly aware of the unusual opportunities this market affords.

They have watched this industrial infant emerge from its swaddling clothes and don the garments of a man. They have observed with admiration and approval its stepped-up production, and its consequent increased orders for materials.

Aggressive Leadership

These manufacturers who have been in "on the ground floor" of the electric refrigeration industry are acquainted with the fact that its market is but 10 per cent saturated.

Moreover, they are cognizant of the progressive, hard-driving leadership of these organizations, and feel confident that no stones will be left right-side-up in the path of this industry toward a more adequate supply of electrical refrigeration to the American public.

To those manufacturers whose metal products have not yet been pressed into service by electric refrigeration concerns, a welcome message may be delivered.

Here is an industry, these untried manufacturers may learn, which has not only safely weathered the storms of the depression, but has established new records in so doing.

Expansion Programs

The financial statements of many of these companies show earnings which top even those of the bumper year 1929. Expansion programs are under way, or being planned. Other concerns are entering the field, and promise to keep the competitive pot boiling.

Companies which are now furnishing metals and metal products to electric refrigeration manufacturers consider themselves fortunate for the volume of business they have received in the past, and for the enlarged orders they expect to receive in the future.

Manufacturers who have not considered the refrigeration industry as a potential market will find it profitable to direct the attentions of their research departments toward developing adaptations of their particular products to this growing new business.

They will find electric refrigeration engineers not only eager to listen to their story when they have new developments to report, but willing to meet them more than half way in adapting their metals to the needs of an electric refrigerator.

The industry is still young enough to learn new tricks quickly.

The Romance of Metals



Electric furnace used for alloying in Detroit plant of Michigan Steel Casting Co.

HOOVER, WIFE TRANSLATE IMPORTANT TREATISE

Washington, D. C.—The whole world is acquainted with Herbert Hoover's record as a public administrator, but comparatively few know that he has to his credit the translation of the most authentic and valuable treatise on mining and metal working that has survived from the Middle Ages.

Collaborating with his wife, Lou Henry Hoover, the present chief executive of the United States translated the "De Re Metallica" of Georgius Agricola, a German metallurgist, from the original Latin back in 1912.

The task of these famous collaborators was made complex by the fact that Agricola, a pioneer in his field, found no adequate Latin technical terminology available, and was forced to use ancient Latin words and coin new ones.

Commonwealth Brass Co. Uses Secret Formula

Detroit, Mich.—The hot forging nuts, tees, crosses, and elbows produced by the Commonwealth Brass Corp. are made from slugs of brass according to an exact formula by automatic machinery, according to P. Tazelaar, of that company.

Automatic screw machines are used for producing straight fittings from extruded brass rod. The fittings are fabricated from alloys of copper, lead, zinc, and tin, poured according to a secret formula. This material is not known by an advertised trade name.

The metal thus fashioned has a very fine granular structure, says Mr. Tazelaar, and produces a fitting which is seepage-proof with any of the refrigerants employed by the industry.

Nickel Is Important In Refrigeration Industry

By A. J. Wildman
International Nickel Co., Inc.

Nickel and its alloys enter into every phase of this industry, including production machinery, unit parts and cabinets. Let us first consider the uses in production equipment.

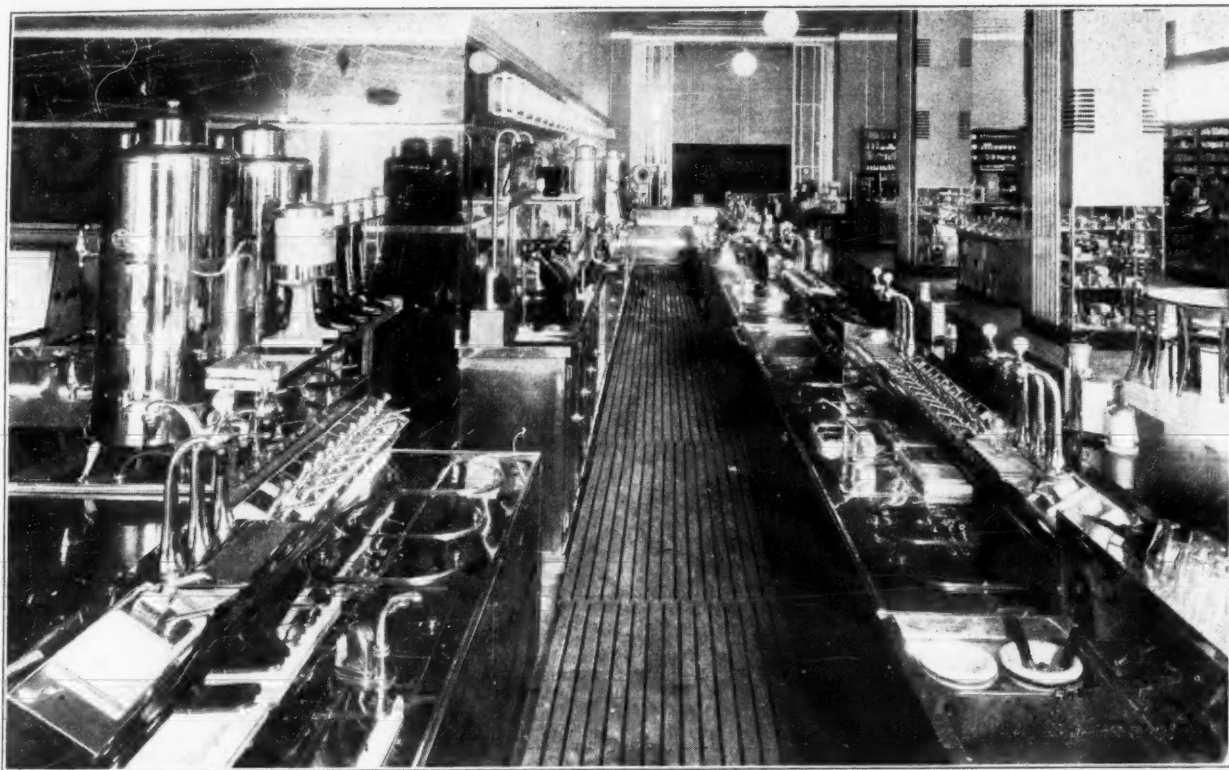
Porcelain enamel and similar finishes are standard on all modern cabinets. To insure proper results it is essential that the steel base be thoroughly cleaned of any oxide, dirt and grease.

The usual method of removing these adhesions is to pickle the steel in an acid bath. This necessitates the use of highly corrosion-resisting materials for tanks, tie-rods, ventilating equipment, cranes, racks, etc.

The excellent service and economy of Monel metal, a nickel-copper alloy containing two-thirds nickel, has been definitely proven over years of service for this type of equipment, and it has been adapted by many refrigerator companies for their pickling work. Some Monel metal baskets have been in constant production in this severe service for eight or nine years.

The high tensile strength of Monel metal and its ready availability in all commercial forms enables racks and baskets to be made considerably lighter than the old style heavy casting, giving greater capacity and speeding up production.

Corrosive fumes arising from pickling tanks form a serious impediment to efficient work in pickling rooms, but ventilating fans and hoods of Monel metal successfully withstand these corrosive fumes.



The world's biggest soda fountain, found in Chicago's Merchandise Mart, is made of Monel metal.

Monel metal tie-rods on wooden tanks resist the acid solution to the same high degree, so that the tanks can be drawn tightly together at all times.

Since Monel metal contains no zinc, naturally dezincification cannot occur; and whatever loss of weight that may occur is taken from the outside of the rods, leaving the heart a solid center with full strength. Utensils, acid pails,

scuff plates, and similar minor applications have also been developed.

In the enameling plant burning racks of Monel metal and other nickel high heat-resisting alloys are used to resist the highly oxidizing conditions encountered. Nickel alloys are also essential in the performance of pyrometers and similar apparatus.

A recent development is the addition

of small amounts of nickel to cast iron mixtures for such important refrigerator and compressor parts as cylinders, crankcases, plate covers, etc.

Density is an important feature in castings of this type, and heretofore this characteristic has not been readily obtainable in a cast iron which would machine at a desired production rate.

Density Secured

By the use of a small amount of nickel in a suitable base mixture, a close-grained dense material is secured which offers no problems in the machine shop.

The wear resistance in cylinders is, of course, an essential requirement in refrigerator units, and many manufacturers are specifying a Brinnell hardness of 190-200 in the cylinder wall in order to obtain good wearing service.

These cylinders are usually of light section and frequently contain thin section cooling fins. Difficulty has been encountered in the past in obtaining this hardness while at the same time maintaining a gray iron throughout which could be readily machined.

Cast iron mixtures containing a suitable amount of nickel or nickel and chromium are providing a solution for this difficulty.

A survey of 16 important manufacturers using nickel cast iron shows the average nickel content slightly below one per cent. This is particularly significant since the addition of this small amount of alloy is materially reducing the number of castings rejected, frequently after considerable cost has been expended on machining.

Tool Wear Reduced

Machining time has also, in many cases, been speeded up. Tool wear is reduced because of the uniformity in structure of the nickel cast iron.

From the consumer's angle this hard, close-grained, long-wearing nickel cast iron enables the unit to retain a higher degree of compression in the cylinders and naturally results in better operating service.

The application of pure nickel to nickel-plating hardware and similar parts is too well known to need any description; but it is well to point out that experiments have shown that chromium plate can best be applied to articles which have been previously nickel and copper plated.

All alloys containing a considerable percentage of nickel are identified by attractive silvery appearance, together with high resistance to corrosion and ease of maintenance.

Eye Appeal

These properties have been taken advantage of in the use of Monel metal and other high nickel alloys for exterior trim, screw machine parts, ice cube tray compartment fronts, etc., on household boxes, and trim, linings, accessories, and bases on commercial cabinets.

The modern trend toward attractive eye appeal and display in merchandising, recognized by outstanding merchandisers of high priced articles, has reached the retail food outlets, and modern attractive-looking refrigerated display equipment has been developed.

With the advent of mechanical refrigeration for the merchandising of ice cream, the exterior of the cabinets were modernized to keep pace with the mechanical advancement. Monel metal tops have been standard from the beginning.

Soda fountains, too, may be considered a definite part in the refrigeration field, and here again nickel alloys were selected from the start and have continued in popularity.

Chromium Produced Under Complex Conditions

By Edwin Smith
United Chromium, Inc.

THE rapid expansion of the use of chromium in the last few years on automobiles, electric refrigerators, plumbing, hardware, furniture, and even jewelry, has left us all a little dazed about what this new metal is, where it comes from and how it is used.

Chromium is a metal, in its own right, so to speak, like iron, copper, silver and gold, and not a mixture of metals (or alloy) such as brass or solder. The peculiar properties of chromium—its hardness, white color, and non-tarnishing qualities belong to the metal, and are not imparted to it by any mechanical working.

The fact that chromium does not tarnish in the air and resists corrosion to a remarkable degree, allies it to the group of noble metals of which platinum and gold are the best known. Unlike most of the noble metals, however, chromium has never been found free in nature, but always in combination with other elements.

All Over World

The compound from which practically all the chromium entering commerce today is obtained in a combination of chromium, iron, and oxygen known as chromite. This mineral is found scattered all over the world. The most easily worked deposits are located in Rhodesia, New Caledonia, Greece, Cuba and the Transvaal. About half of the world's supply comes from Rhodesia, and a third from the other localities named.

The ore is a grayish-colored rock with fine specks of black chromite scattered through the mass. The crude ore is exported to the consuming countries in Europe and North America, where it is ground and the chromite separated from the waste rock.

The concentrates of chromite, looking like coarse black sand, are intimately mixed with crushed limestone or chalk and heated. Chromite of lime is formed, which is dissolved from the mass with water.

Chromium Compounds

After filtering and clarifying, soda ash is added to the solution. Soluble sodium chromate and carbonate of lime are formed. The solution containing the sodium chromate is filtered from the sludge of lime carbonate and evaporated until the sodium chromate crystallizes.

Sodium chromate forms the starting point for a long list of chromium compounds used in a number of industries. Among them is chromic acid, which forms the basis of commercial chromium plating solutions.

When chromium plate is required on an article, the piece is first polished, thoroughly cleaned, and usually nickel plated. Taken from the nickel tank, the part is rinsed in water, dried, and buffed to a bright lustre. Another cleaning operation, and the part is suspended in the chromium plating solution.

In a few minutes the plating is complete, the part is given a final rinsing in water and dried. The plated piece, whatever it is, automobile bumper, or finger ring, is inspected, given a last polishing (if necessary) and is ready for marketing.

Wrought Iron Used For Commercial Jobs

Pittsburgh, Pa.—That wrought iron pipe may be used profitably in commercial electric refrigeration installations is the opinion of Stanley P. Watkins, metallurgist for the Wrought Iron Research Association.

"In large refrigeration installations," says Mr. Watkins, "difficulty is often encountered due to the corrosion of pipes by water. This is particularly true in the case of heat exchange systems, wherein water is used to absorb the heat liberated by the refrigerant."

"This is accomplished by placing a small diameter pipe inside a large diameter pipe, allowing the water to flow around the smaller, which contains the refrigerant. Corrosion takes place on the inside of the larger pipe and on the outside of the smaller."

"Several cases have been brought to our attention of steel pipe having been replaced by wrought iron in such installations. Wrought iron has earned a reputation for resisting the corrosive action of fresh and salt water. It is widely used in ice-making plants for conducting the brine and ammonia solutions."

Commercial wrought iron is usually made from cast iron by removal of its carbon and silicon so as to convert it into pasty particles, and by squeezing these together in a bath of cinder or slag until a coherent mass results, which retains permanently an important quantity of that slag.

A Strong White Metal

... highly corrosion-resistant
... relatively easy to fabricate

Ambrac is an exclusive Anaconda alloy composed principally of copper and nickel. This alloy, white clear through, combines the strength of mild steel with remarkable resistance to corrosion. Unlike other high-strength white metals, Ambrac is not refractory, but can be drawn, spun, stamped and double seamed almost as easily as brass. It has the further advantage of spot welding perfectly, and resistance welds made in Ambrac are unusually strong.

Ambrac Metal is available in the form of sheets, wire, rods, tubes and drawn moulding for the fabrication of screws, bolts, racks and metal trim. Detailed information on request.

Other Anaconda Products used by the Electric Refrigeration Industry include:
Copper, Brass and Bronze in sheets and strips.

Free-turning Brass Rods.

Brass, Tobin Bronze* and Everdur* die pressed parts and forgings for valves and fittings.

Everdur* rods and forgings for valves and other parts in contact with corrosive agents.

Where strong, non-rusting screws are needed and white metal is not essential, they can be obtained in Everdur* from leading fabricators.

*Trade-marks Reg. U. S. Pat. Off.



AMBRAC METAL

TRADE-MARK REG. U. S. PAT. OFF.

AN ANACONDA PRODUCT MADE BY THE AMERICAN BRASS COMPANY, WATERBURY, CONNECTICUT

Many Refrigerator Parts Are Made Of Copper

RISING rapidly on the wings of public acceptance, the tremendous growth of electric and gas refrigerator sales has developed a sharply increasing market for copper and its alloys, especially brass, according to a survey completed recently by the Copper and Brass Research Association.

Since sulphur dioxide reacts chemically with iron in the presence of moisture, copper and brass fittings are used for all lines with this refrigerant unless certain portions are hermetically sealed. With methyl chloride, either copper or iron can be used, but the red metal is utilized by most manufacturers employing this refrigerant.

Copper's largest use is in the condenser and evaporator, where coils of copper tubing and sheet brass for fins and brass castings, or forgings for parts of the evaporator tank, absorb the largest poundage.

In electric motors considerable copper wire is absorbed. The liquid receivers account for a fair proportion of sheet brass or copper. Compressors do not contain as great an amount of copper or alloys, but certain valves may be made of brass or Monel metal. Bronze is used for bearings and bushings.

Throughout the entire cycle copper tubing is generally employed to transport the gas or liquid refrigerant, and brass forgings or castings are used for valves and fittings and connections; brass and bronze rod find considerable use for screw machine parts.

A diagnosis of the various component parts of a typical compression refrigerator and the copper involved therein follows:

Compressor

In the stuffing box at the fan end of the shaft will be found various methods of sealing in the refrigerant. Some of these employ copper siphon bellows and a bronze thrust collar.

As the quiet operation of the compressor depends upon its bearings, a good quality bronze is used at points of contact with the crank-case and the connecting rod. In the hermetically-sealed unit the stuffing box has been eliminated.

For tubing lines leading to and from the compressor, copper is generally used, especially with machines employing sulphur dioxide as the refrigerant. With methyl chloride the choice between copper and steel is optional, but copper predominates. Connections and fittings are usually made of brass.

Liquid Receivers

Inasmuch as liquid receivers are compartments which contain the supply of liquid refrigerant after transformation from the gaseous state in the compressor, receivers in types with sulphur dioxide are usually constructed of brass castings or copper (or brass) sheet.

Tubing to and from the receiver is made of copper with the necessary connections and fittings of brass. With methyl chloride as the refrigerant, iron or steel castings can be utilized for the receiver, and steel tubing for the lines.

Domestic Evaporators

Headers.—The domestic type evaporator consists of a header of cast or forged brass into which the liquid flows through a brass expansion valve.

Within the header is some form of control for the amount of refrigerant, the common form being known as a float valve, consisting of a brass or copper hollow ball or float, which by its rise or fall opens or shuts the expansion valve. Inside connections are made of brass.

A brass baffle catches the small amount of oil which the refrigerant drops as it vaporizes and passes it back to the crank-case of the compressor through a copper tube. Brass shut-off valves are installed at the connection of the two tubing lines to the headers.

Evaporating Coils

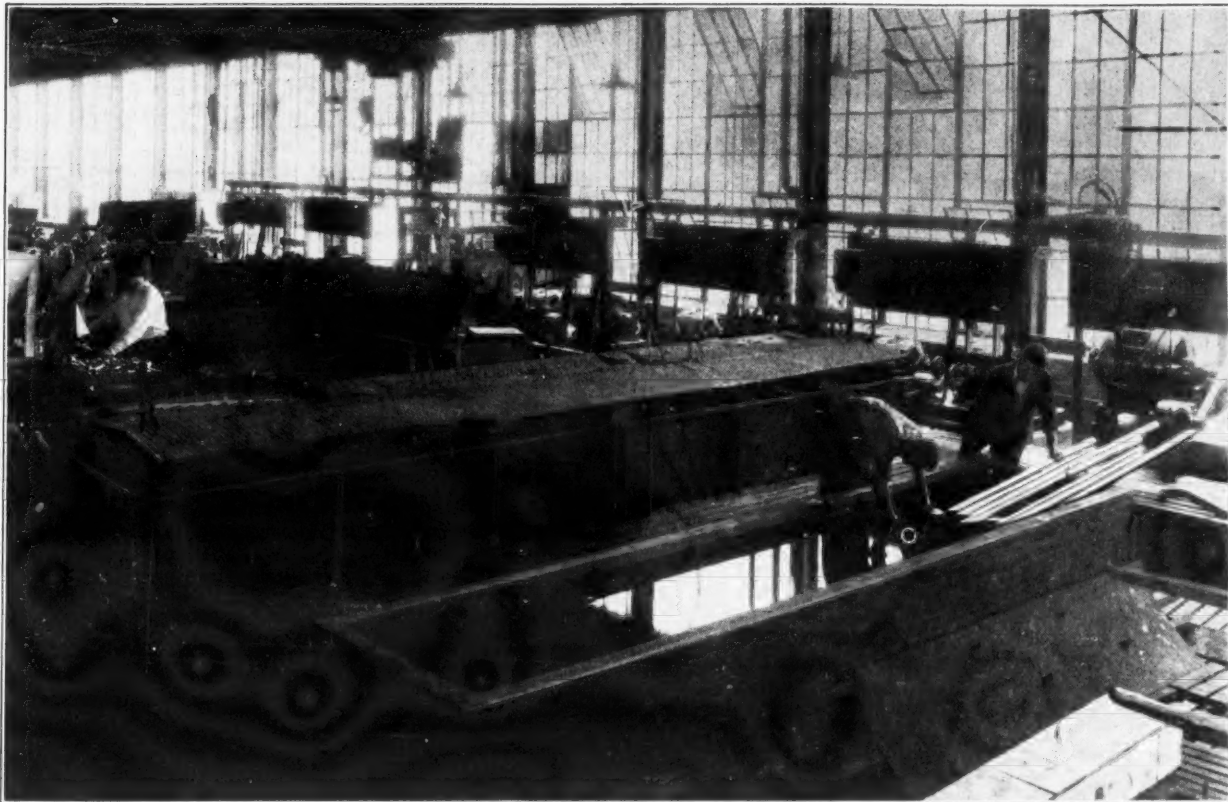
Evaporating Coils.—The cooling operation is performed in either the direct or indirect method. The direct method consists of a series of tinned copper coils (except in special cases) shaped to fit around the trays containing water to be frozen.

These trays may be directly exposed to the inside surface of the coils, or they may be contained in a box-like wall of tinned copper sheet. The amount of copper tubing here used varies considerably according to the size of the evaporating unit.

The indirect method utilizes proportionately as much copper tubing, but a large amount of tinned copper sheet is used as a tank around the evaporating coil. This type is an older style, partially abandoned in favor of the direct type as a means of cutting production cost.

Trays and Pans.—Materials used in the construction of the ice-forming trays differ greatly. Tinned copper is largely used. Rubber's claim to usage is through

How It's Done



Almost the entire operation of chromium plating is shown above. The parts are cleaned, polished, and given a bath in the chromium solution. In a few minutes they're plated.

its flexibility, which allows for easier ejection of the ice cubes. Some manufacturers prefer stamped aluminum.

The fronts of most trays have brass or copper handles and are chrome-plated. In some cases Monel metal fronts are being used.

Some units include a special pan for freezing of desserts or as a food container, these being made of tinned or nickel-plated copper or other suitable material.

Commercial Evaporators

Headers.—The headers in commercial units are essentially the same as, but different in shape from, those in domestic use.

Evaporating Coils.—The evaporating coils are radically different. Attached to each of the copper tubing lines are either pieces of copper or brass sheet, known as fins. In only a few cases do they contain the freezing trays found in domestic types.

With the indirect system, the evaporator cools a tank of brine, which in turn is circulated anywhere desired in the cabinet or counter.

Condensers, Domestic and Commercial

Air-Cooled.—The original type of air-cooled condenser consisted of a lengthy copper coil wound completely round the entire compressing unit.

Development of air-cooled condensers has undergone two steps. The first development was the attaching of a fan to the motor shaft, which created a forced draft and consequent faster cooling with a smaller unit.

The second step was increasing efficiency by the creation of finned tubing, consisting of copper tubing with round or square pieces of sheet copper or brass which enlarged the cooling surface.

Water-Cooled.—A radically different step from the continuous copper coil surrounding the unit was the introduction of the water-cooled condenser. The ability of water to carry away heat faster than air allowed the manufacturers to employ a smaller amount of copper tubing to achieve the same efficiency.

This type is used almost wholly in commercial types and water-cooler units, as it is inconvenient to make water connections in the households. Connection with the compressor is effected by copper tubing and brass valves and connections.

Motors

The pounding indirectly consumed by the refrigeration industry in the use of electric motors is the largest of any assembled part. For ordinary household units the average size is $\frac{1}{4}$ h. p. This varies from $\frac{1}{8}$ to $\frac{1}{2}$ h. p., with occasional large installations running higher. The copper content is mostly in the form of wire for windings and bar for commutator.

In commercial units the general range is from 1 h. p. to 2 h. p., with occasional units running higher or lower. The average is $1\frac{1}{2}$ h. p.

Water-Coolers

The common type of refrigerating unit in the typical water-cooler is an adaptation of the water-cooled condenser type. Small use of tinned copper is noted. The motor is usually $1/10$ or $1/8$ h. p. The tubing carrying the water to the spigot is usually of brass.

Application of Copper to Absorption Type

The restricted use of copper tubing in absorption type refrigerators is confined to the three lines serving to carry

gas to, and water to and from, the absorption type of refrigeration unit.

Brass is utilized only for special parts, such as the gas burner, the thermostat control, the water regulating valve, two pressure regulators, the water strainer,

and incidental valves. This is exclusive of cabinet construction.

In the units using electricity for heating power, brass consumption is materially reduced, as steel is used in the heating coils.

Armco Iron Is Used For Porcelain Enameling

By William E. McFee
American Rolling Mill Co.

YEARs ago, when porcelain enameling was still in its infancy, a specially processed pure iron was developed expressly for fine porcelain enameling.

It was necessary to go back to the open hearth furnace in order to create a metal that would be consistently suitable for porcelain enameling. And this is what was done in the case of Armco ingot iron.

Raw materials are carefully selected. During the purifying process which follows, more than 100 tons of molten iron are exposed to terrific temperatures hour after hour.

The period required for purification of iron is usually several hours longer than that required for ordinary, semi-refined iron and steel.

This metal is virtually free from the impurities that cause blisters and other surface defects. Another advantage is seen in its pronounced tendency to lie flat when exposed to the high furnace temperatures employed in vitreous enameling.

Moreover, pure iron has a characteristically fine-textured surface, which takes and holds enamel firmly and evenly. So close and adherent is the bond between the china-like porcelain enamel and the pure iron that it can truthfully be said that it is "fused on to the metal."

Armco ingot iron retains its gloss and lustre permanently, provided the finish is accorded reasonable care.

GOOD DESIGN Must Be Backed By GOOD CONSTRUCTION

AN Electric Refrigerator can be no better than its component parts. If the refrigeration lines corrode, if compressor or evaporator rust, if the slightest leaks develop—*goodbye to good service!*

Copper, Brass and Bronze parts assure greatest efficiency, along with safe and uninterrupted service. They are rust-proof and highly resistant to corrosion.

Our Technical Department may be consulted without charge on any problems concerning the use or application of our metals. In the past year we have successfully cooperated with eight refrigeration companies in solving individual construction problems and advising on the correct alloy for specific purposes.

COPPER & BRASS

RESEARCH ASSOCIATION

25 Broadway New York

Midwestern Office
Builders Building
Chicago, Ill.

Southern Office
Shoreham Building
Washington, D. C.

Canadian Office
67 Yonge Street
Toronto, Canada

Pacific Coast Office
Architects Building
Los Angeles, Cal.

BUYER'S GUIDE SECTION ELECTRIC REFRIGERATION NEWS

The Business Newspaper of the Refrigeration Industry

Published by

BUSINESS NEWS PUBLISHING CO.

550 Maccabees Building, Woodward Avenue and Putnam Street
Detroit, Michigan. Telephones: Columbia 4242-4243-4244

Subscription Rates:

United States and Possessions: \$2.00 per year; three years for \$5.00
All Other Countries: \$2.25 per year; two years for \$4.00

Advertising Rates on Request

F. M. COCKRELL, Publisher

WILLIAM JABINE, Editor

FREDERICK W. BRACK, Advertising Mgr.

JOHN DREITLER, Managing Editor

GEORGE N. CONGDON, Business Manager

GEORGE F. TAUBENECK, Assistant Editor

Eastern Manager: H. A. DeLashmuth, 1950 Graybar Bldg., New York, N. Y.

Phone Lexington 9113

Chicago Representative: F. W. Henkel, 306 S. Wabash Ave., Phone Wabash 6668

Copyright 1930 by Business News Publishing Co.

Vol. 5, No. 4, Serial No. 106, Part 3

October 22, 1930

The Age of Alloys

HANDS are important. Anthropologists date the beginning of the emergence of manlike types back to the buried epoch when primates began using their forelimbs for grasping. That action led to the upright posture, the opposable thumb, and a sequence of other developments which resulted in man.

Tools are even more important. Historians take up the tale where the anthropologists bid adieu, and trace the beginning of civilization to man's first use of some implement which increased the range of his power and strength. From the first crude arrow-heads man has gradually added to his collection of tools and material aids, until today the man who wants to build a device which will bale heat out of a food-storage box has everything at hand to do the job. All of this, of course, came about very slowly. Men of the Old Stone Age (Eolithic) were followed by descendants in the New Stone Age (Neolithic). Came the discovery of metals, and the Bronze Age. Most recorded history is included in the era known as the Iron Age. The last few years, however, have witnessed a surprisingly rapid development of new tool materials—alloys—which promise to accelerate man's conquest of nature.

Two decades ago a few simple alloy steels had appeared, such as nickel steel, Hadfield's manganese, vanadium steel, chrome steel, and silicon steel. There followed high-speed steel, chrome-nickel, chrome-vanadium, silico-manganese, molybdenum, nickel-molybdenum, stainless, high-chrome-low-carbon, high-chrome-high-nickel, pearlitic manganese, and chrome-aluminum (nitralloy) steels. Still other steels are being introduced to the world in breath-taking fashion.

The key to all this progress toward increasing the strength-weight ratio, the machinability, the life and service, and the ready adaptability of metals, has been heat treatment. Studies in this field have been responsible for the unleashing of such interesting and fruitful recent developments as nitriding, heat-treated alloy steel castings, rustless steels, continuous rolling mills, continuous normalizing furnaces, and electric ovens.

So sudden has been the debut of the new alloys and heat treatment processes that Mr. General Public has not yet awakened to the new world which is springing up all around him. It is a more permanent world, and a more beautiful one, which is resulting from the widespread adoption of alloys. Metals which resist heat, cold, water, atmospheric conditions, corrosion, rust, wear, disintegration, strains; which are more pliable, more easily machined, more economical, lighter, stronger, and more esthetically attractive, are now being used to make vastly improved skyscrapers, factories, transportation equipment, home appliances, and even furniture. The Age of Alloys is at hand.

The possibilities of a metal like stainless steel, for instance, seem unlimited. Methods of forming, riveting, and welding this highly attractive metal have been devised rapidly; and architects and designers find it available for new purposes every day. It is replacing both the noble metals, such as gold and platinum, and its more plebeian ferrous relatives. New realms will be invaded by this knight in shining armor as quickly as research laboratories chart the course.

To the highly progressive manufacturers of metal products the electric refrigeration industry offers a market, a problem, and a challenge. Various types of metals are now used in great quantities by the industry. That other metals will be adopted as fast as they are made available is attested by the fact that refrigeration manufacturers are comparatively young, forward-looking, and engaged in a pressing competitive struggle which demands the employment of every possible means to improve their products.

Engineering departments of refrigeration companies seem never to be satisfied with their present solutions to the problem of keeping mankind's food at preserving low temperatures. This healthy industrial condition leaves the door of opportunity wide open, wagon-room wide, for the metallurgical research laboratories. Undoubtedly better refrigerator metals will mean better refrigeration.

Young and progressive is the refrigeration industry. Old and progressive (paradoxically!) is the metals industry. Mutual research should provide a wealth of new materials for the refrigeration manufacturer, and a profitable new market for the various metal products which are ushering in the Age of Alloys.

Off Duty in Beloit, Wisconsin

By GEORGE F. TAUBENECK

Not long ago we were Off Duty in Bloomington, Illinois. There was an interesting phenomenon in that city: the advance guard of the predicted industrial decentralization movement. Said advance guard was the Williams Oil-O-Matic Heating Corp., aided and abetted by the Beich Candy Co., the Magirl Furnace & Foundry Works, and other members of Bloomington's Factory Row.

A fortnight ago there came an opportunity to scrutinize the movement a little closer, to observe hardy pioneers who have pushed even farther into the more sparsely settled hinterland of industrial habitation. Beloit, Wisconsin, ladecz and gemmum, is the subject of this issue's miniature (in keeping with the trend of the times) travelogue.

Located in this vest-pocket-size community is the General Refrigeration Co., which produces the Lipman units. Other factories have been established in Beloit, too, but to a man the inhabitants do their pointing with pride to the neat General Refrigeration Co. plant "down the street West a-ways" whenever given a chance. It's the show place of the town.

Julius Caesar, of Gaul-in-three-parts fame, once asserted that it was more honorable to be first in an Iberian village than second in Rome. Companies such as Williams and General Refrigeration have learned that being first in a small city is not only honorable, but profitable and happiness-laden in the bargain.

In Chicago, Detroit, New York, Philadelphia, and their mighty sisters, one does well to evoke a fractional eyebrow lift with the announcement that one belongs to the Greatest Refrigeration Company in the World.

In that city are probably located also the World's Greatest Museum, the Biggest Shoe Factory in the Country, the Longest Street in This or Any Other World, the World's Champion Flagpole Sitter, the 1931 edition of Miss Universe, the King of All the Bootleggers, the Highest Rating Machine Gunners West of the Argonne, and the Most Corrupt City Government in All History.

Trying to get an audience or wield commanding influence in a modern metropolis is almost comparable to the plight of the 130-pound substitute who finds himself, with the ball in his hands, completely surrounded by charging 200-pounders.

In the small community, however, a nationally known concern possesses all the known Keys to the City, owns 99-year leases on the seats of

honor at all the feasts, and is consulted on affairs of moment ranging from the new fountain on the public square to the proposed adoption of a city manager plan.

To some "executives," buried under several strata of filing cabinets and folders of unanswered correspondence, such adulation and civic responsibility might be annoying. But not to the officials of the General Refrigeration Co. They enjoy their jobs, and the power that accompanies them.

Beloit, like Bloomington, backs its foremost industry with the same gusto that other cities back pennant-chasing baseball teams. In the corner drug store, through the bars of bank windows, from the restaurant cashier, and at the freshly whitewashed filling station, one hears the tale of loyalty to a Beloit institution.

This brothers-in-the-bond loyalty pervades the entire General Refrigeration Co. Possibly the national organization imbibes some of this local co-operative spirit when it comes to Beloit for conventions. At any rate, the conclaves of this outfit are serious, strenuous, and result-getting.

Homogeneity, compactness, and mutual assistance, three of the outstanding characteristics of the small city, spread out into the organization of the company whose home office is in a place of this type.

Beloit is a garden spot. Perhaps our enthusiasm for its beauty might thin out a bit if we visited it in the winter; but just now, clad and bedecked in autumn's gorgeous finery, it presents a breath-taking picture.

A heritage of trees, noble descendants of the hymned forest primeval, envelop and embellish the town. The streets become vaulted naves, riotously colored.

Overhead and underfoot are thick layers of pastel-shaded leaves. What city pavement-pounder wouldn't fall in love with "a place like this at a time like that?"

Peaceful, naturally beautiful, healthful surroundings of this sort make contented workmen. Moreover, the latter take a fraternal pride in the organization for which they labor together.

There are no frills nor fuss nor feathers in the General Refrigeration plant. Shirt sleeves are the rule. Informality is the custom. The inferiority feeling of the underling in the typical big-city establishment is

as totally absent here as a mama's boy at Notre Dame.

High hats went out of style along with front-wheel-drive bicycles and sideburns in Beloit. And since it is a college town, derbies, snap-brims, and fedoras have followed suit.

Beloit citizens are almost as proud of their college as they are of their factories. And the students, thus encouraged and made class-conscious, react accordingly.

The collegiate types celebrated by the cinema are more apt to be ambling around the hill-and-dale streets of Beloit than in any of the universities whose melting-pot football rosters are now receiving so much newspaper space.

Sweaters, pipes, balloon trousers, old Fords, school spirit, and all the row-dew trappings and paraphernalia of the conventional and accepted sophomore are here in abundance. And they have a "perfectly marvelous" succession of laughing days and romantic nights.

In addition to the "immeasurable and intangibles of industrial relations," those satisfactions not disbursed with the payroll, General Refrigeration employees enjoy clean working conditions.

An immaculate factory is enclosed in a smoke-free atmosphere, and has wide streets, well-kept lawns, and scrubbed doorsteps for neighbors.

Peace, pride, power—the unearned increments of industrial decentralization.

Metals Congress Draws Large Crowds

(Concluded from Page 1, Column 1)

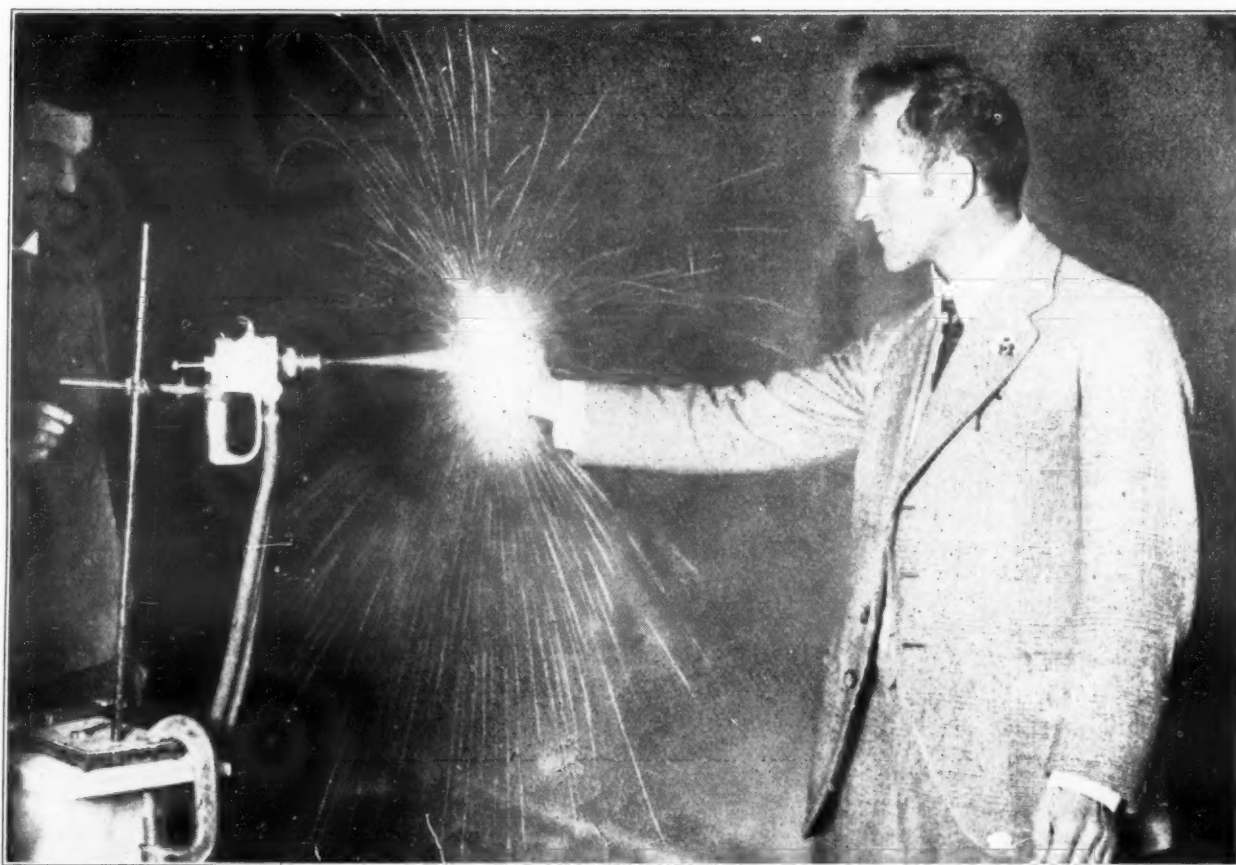
in heat-treating reactions (particularly in carburizing), in higher manganese steels, and in "abnormal" steels, and concluded with an evaluation of the results obtained by carburization with methanegas as a substitute for the charcoal base carburizers.

The youngest of the five Campbell memorial lecturers, Dr. Grossman was introduced by the eldest of the group, Dr. Albert Sauveur.

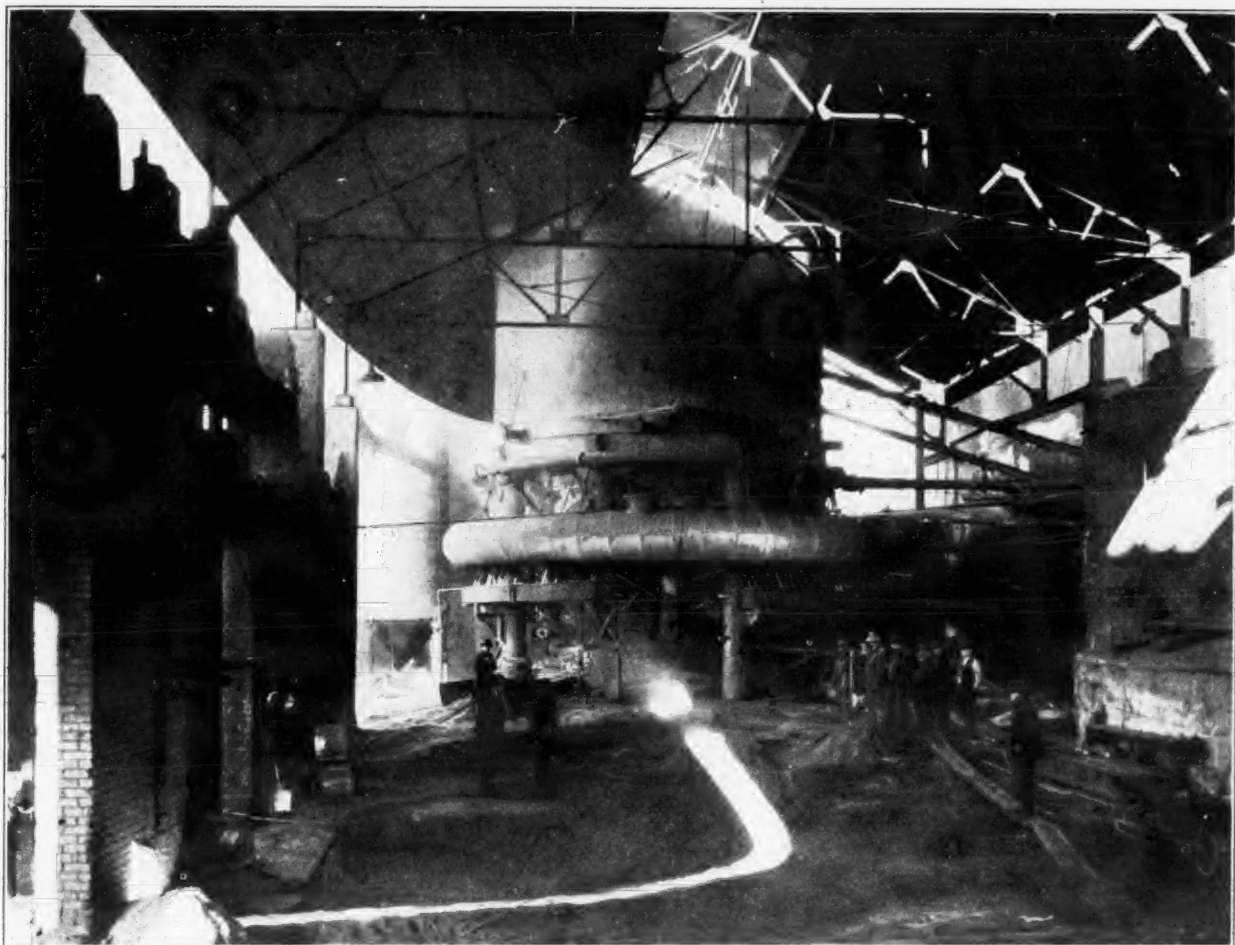
Die casting, alloying, the making of telephone apparatus, aluminum alloys, the making of ingots, and the conductivity of alloys were amongst the most notable discussion themes of the A. I. M. E. sessions.

Special banquets and dinners were bright spots on the programs of each of the technical societies participating in the congress.

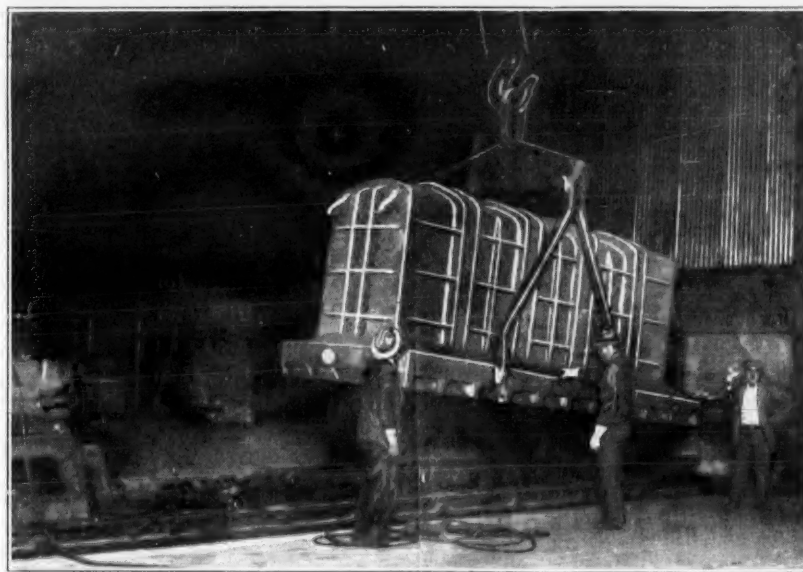
German Scientist Sprays Metal on Wood



DR. M. U. SCHOOP of Zurich, Germany, is shown above demonstrating his newly developed method for spraying liquid metals on wood. Leaving the nozzle at a velocity of 800 meters per second, the metal particles penetrate deeply into all pores and depressions in the wood. Wood plates can be covered on one or both sides with this metal spray, after which they can be cut, bent, nailed, and sawed. By using a sand blast in conjunction with tin or celluloid stencils, decorations can be applied. This "metallo wood" is especially adapted to the construction of refrigerator cabinets, Dr. Schoop believes.



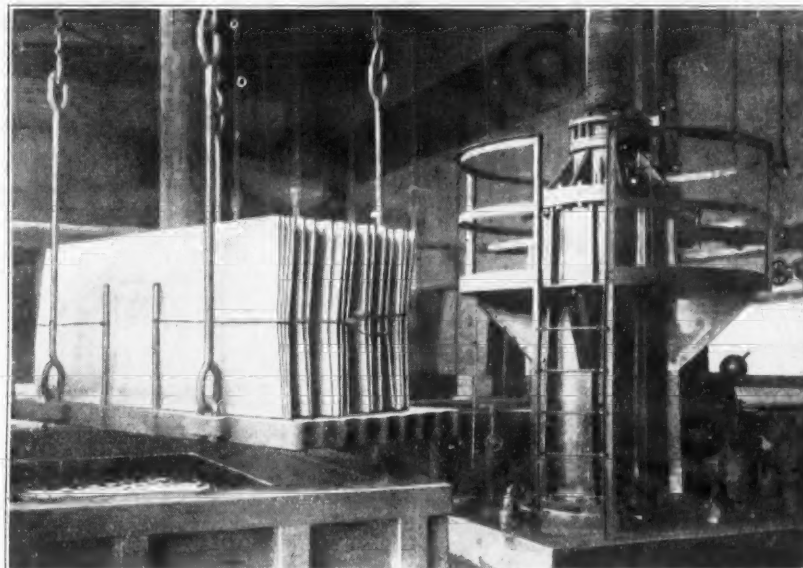
1. The blast furnace is fed tons of iron ore. When it is "tapped," pig iron runs out in a molten stream.



5. Sheets are heated in an annealing box to make them soft and pliable.

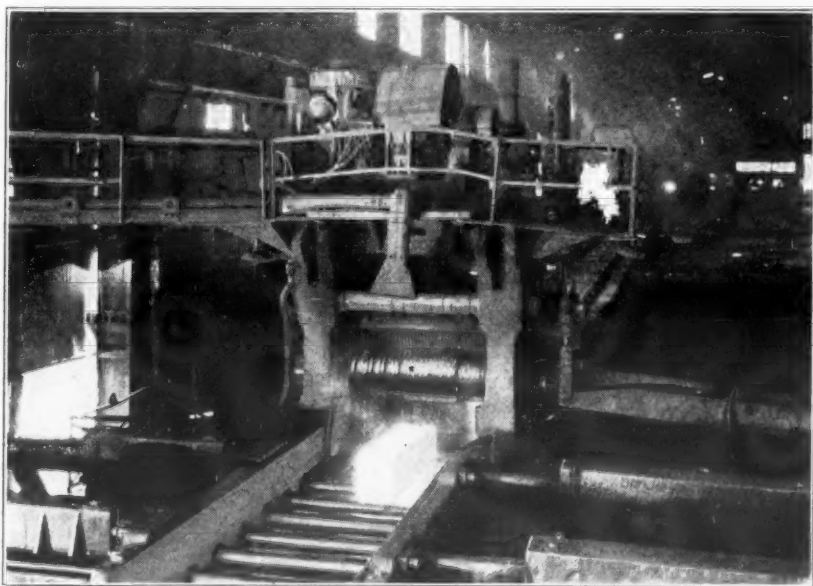


2. Pig iron is converted into steel in open hearth furnaces.

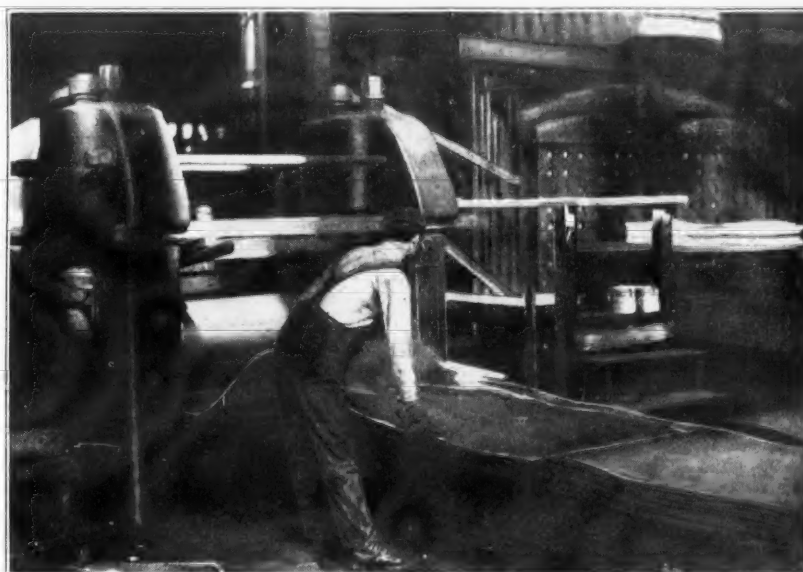


6. To remove surface impurities, the sheets are dipped into pickling vats.

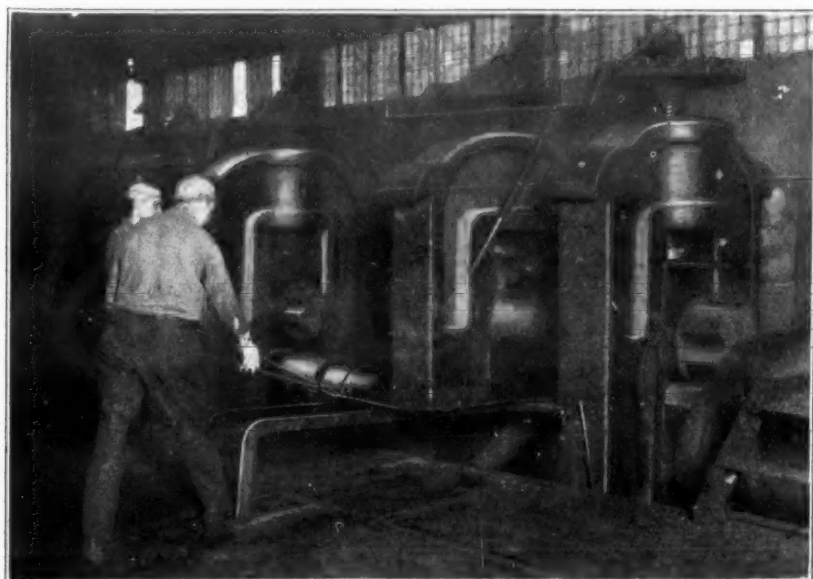
The Making of Steel Told in Pictures



3. Steel ingots go through the first rolling process in a "blooming mill."



7. Passing sheets through cold rolls gives them a surface finish.



4. Red hot steel bars are rolled into sheets by this mill.



8. As a final stage the sheets are made perfectly level in the "stretcher-leveler" pictured above.

Hydrogen Welding Discovered By Accident

By E. L. Manning
Research Laboratory, General Electric Company

IN the evening, after a scorching, hot day, some people sprinkle the porch and sidewalk, as well as the lawn. Evaporation is the process of changing a liquid to a vapor. Such a change uses up energy and leaves the porch and sidewalk cooler than they were before.

After you've played tennis, or hoed the garden, and are all hot and tired and covered with perspiration, standing in a breeze will cool you off rapidly—sometimes too rapidly. The perspiration evaporates quickly, taking heat from the body to do so, and so you are cooled.

Now that's exactly the way the refrigerator works. Some liquid is allowed to evaporate, that is, it is changed into a gas. As it evaporates it uses up (absorbs) a lot of heat.

Gas Elusive

Then the gas is cooled and squeezed together; and it changes back again into a liquid, ready once more to do some cooling. In order to make the refrigerator work, day in and day out, year after year, that gas and liquid must be kept tightly sealed. If it were all liquid, the job wouldn't be so bad. It's the business of playing jai-lor to a flock of gas molecules that turns hair gray.

Engineers solved this problem, on paper, by saying in effect, "All we have to do is build a 'prison' so tight that gas molecules can't possibly escape. We can do that if we weld the joints."

So they built a lot of evaporators with welded joints, tested them carefully to see if there were any gas leaks, found none, and so everybody was happy.

Happy, that is, until one day some time later, one of these evaporators *did* leak—not much of a leak, but a leak just the same. The evaporator had been carefully welded, and still more carefully tested. Yet this leak was discovered later.

Engineers Mourn

To some people, it might not seem so dreadful to have one out of a good many evaporators develop a leak—but that one just took the joy out of life for those refrigerator engineers. They'd planned so carefully to build prisons from which *nothing* could escape—and here was news of a prison break!

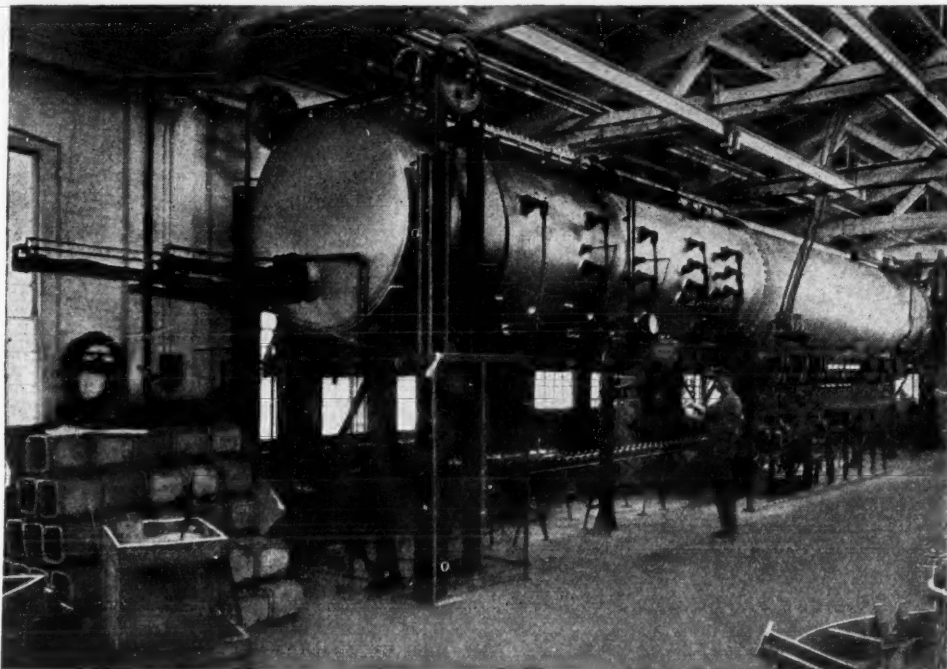
As a result, engineers and laboratory scientists put their heads together. First, they decided to use a different sort of weld—one made possible by Dr. Langmuir's discovery of the peculiar way in which hydrogen gas behaves.

This new welding process—called atomic hydrogen welding—is much more effective than the older methods in preventing tiny holes.

But while these engineers were looking for prisons that gas couldn't escape, they did a thorough job. They found

The General Electric semi-continuous tunnel type furnace for brazing refrigerator evaporator cases; rated 335 kw., 220 volts, 3-phase. This furnace was developed as a result of Dr. Coolidge's accidental discovery that copper melted in hydrogen "wets" iron surfaces just as water wets a tablecloth.

Brazing Furnace in Action



that Dr. Coolidge, a long time ago, discovered that copper, under certain conditions, behaves the way you'd like to when you've made a social error.

There are times when the best of people would like to crawl into a crack in the floor and hide. That's precisely what copper can be made to do, if you know how to do it—and the "how to do it" was what Dr. Coolidge discovered some time ago.

He recorded what he saw in his notebook, and then went on about learning something else.

Looking through those well-preserved notebooks, the engineers learned how Dr. Coolidge came to find this trick copper has. The main job on hand at that time was learning to make ductile tungsten, and Dr. Coolidge, with his assistants, was heating powdered tungsten in furnaces filled with hydrogen gas.

That hydrogen was important. Tungsten is odd stuff. If you heat it in air, the atoms of tungsten get all hot and bothered, and grab off a few—usually three apiece—atoms of oxygen. The process of grabbing oxygen from the air is quite similar to the rusting of iron and steel. Rusting tungsten can be prevented by keeping air away from it; that's why the furnace is filled with hydrogen.

These scientists were heating tungsten in a furnace filled with hydrogen gas. To keep the tungsten where it belonged, they tied it in place with pieces of steel wire.

Copper Wire Used

Once, by accident, someone used a piece of copper wire instead of the usual steel wire. When the furnace was opened, Dr. Coolidge could see that the experiment was ruined, because the copper had melted and spilled the tungsten powder.

Being a good scientist, Coolidge saw more than the ruined experiment. He saw that the copper had run all over the place. Not only where you'd expect the melted copper would be, but practically everywhere.

Curiosity may have killed the cat, but it is also the stuff research is made of. Out came Dr. Coolidge's knife, and presently he was digging around to see how thick the layer of copper was. A knife wouldn't give the answer—he had to use a microscope.

Briefly, he found that copper melted in hydrogen gas "wets" other metals just as water wets a tablecloth. Usually copper doesn't do this stunt—only when the heating is done in hydrogen.

"Wetting"

This "wetting" means that the liquid copper runs all over the place, into cracks and crevices, into holes that are so small even a microscope wouldn't see them.

The refrigerator engineers gleefully built some huge hydrogen furnaces (they nicknamed these furnaces "zeppelins"). First, they welded their evaporators with the atomic hydrogen torch; then copper-brazed them in these huge "zeppelin" furnaces. Shakespeare once said something about making assurance doubly sure—and that's just what was done.

Technical Explanation

Molten copper wets iron surfaces and flows upon them because of the affinity of iron for copper.

Advantage is taken of this fact by using hydrogen atmospheres in copper-brazing furnaces to remove oxide impurities and prevent reoxidation under heat, so that the copper will have a clean surface upon which to flow.

It is known that a copper-iron alloy is formed on iron surfaces at the brazing temperature (2,100 deg. F.). This alloy is only "skin deep," consists of

Contents

A TYPICAL modern electric refrigerator contains the following metals, ranked according to the weight used of each:

1. Cast iron.
2. Carbon steel.
3. Ingot iron.
4. Copper.
5. Brass.
6. Lead.
7. Tin.
8. Aluminum.
9. Bronze.

Other metals used in small quantities include cadmium, Swedish steel, nickel, chrome-nickel steel, Chromium, Monel metal, silver, and zinc.

approximately 3 per cent copper and 97 per cent iron, gives the copper a good bond with the iron, and provides a strength that cannot be obtained by merely "pasting" two surfaces together by means of a filler.

This attraction of iron for copper is responsible for the flow of copper upon hot iron surfaces. However, it is not appreciable on cold surfaces, as evidenced by the fact that spelter does not run into torch-brazed joints beyond the localized hot areas.

Copper not only flows freely and uniformly through the evenly heated joints brazed in an electric furnace, but it also extends into the grain boundaries of the iron, forming a grip which is not readily released.

Affinities

In addition to the affinity of iron for copper, there is a stronger affinity of copper for iron, illustrated by the fact that iron stirring rods are quickly eaten away and dissolved in pots of molten copper at temperatures below the melting point of iron. At 2,100 deg. F., copper holds between 3 and 4 per cent of iron in solution.

This copper-iron alloy is formed within the joints of objects brazed in a hydrogen furnace and is retained (and saturated with iron) upon "freezing" of the metal. It is stronger than pure copper, and will form quickly in tight joints containing only a thin film of copper.

Capillary attraction comes into play quite prominently in a copper braze, since the molten copper wets the iron surfaces so readily and because the copper is very fluid. Its consistency at the brazing temperature is about that of kerosene.

Drawn Two Ways

In a joint that is clean and tight, the copper will be drawn upward as well as downward, by surface tension, in a manner similar to that in which water climbs in a small capillary tube.

First, the metal to be brazed should be clean, so that the copper will wet it. Second, the joint should be fairly tight, to take advantage of the available capillary attraction.

The hydrogen atmosphere maintained within a brazing furnace cleans oxide film and some impurities from iron surfaces, giving excellent conditions for a braze, and, if the piece is cooled in hydrogen, gives it an attractive, clean, white appearance when removed from the cooler.

Heavy oxide scale or the lead skin often present on cold-rolled stock must

be removed from surfaces of steel at joints to be brazed, by grinding, shot blasting, or some similar manner, because hydrogen will not remove such materials.

The maximum tolerance for a gap in a joint to be brazed has been found to be about 0.003 in. Within this limit, the capillary force may be depended upon to draw copper into the joint, and the film will be transformed into the copper-iron alloy by diffusion of iron into the copper.

Beyond this tolerance, difficulty is sometimes encountered in getting the copper to flow into, and remain within, the joint. If the copper should remain (with a larger tolerance), the joint would probably freeze with pure copper only at the center of the film. Such a joint would, of course, have the strength of copper.

Approaching the problem from the opposite direction, special samples have been prepared in an effort to determine whether joints could be made too tight for copper to flow into them. It has been found, however, that such a condition cannot be produced, because as the tightness increases, the flow of copper improves.

The pieces found strongest in test were those that had the most external pressure applied. Hence, it is desirable to assemble parts to be copper brazed with press fits whenever possible.

Phenomenon

Another phenomenon, which imparts strength to a copper-brazed joint, is the tendency for grains of the steel to grow together across the joint.

If two pieces of ordinary steel with machined surfaces are allowed to rest together under pressure for a year or two, they will sometimes become stuck together by a growth of the grains at the contact surfaces, and, if two blocks with about 100 lb. per sq. in. pressure upon them are run through a brazing cycle at 2,100 deg. F. without copper, the joints will practically disappear because of grain growth.

Upon pulling, however, the joint will break apart, because it does not have the strength of the body metal.

This action of grain growth can be approached by the addition of molten copper into the hot joint, without application of external pressure. There is also some precipitation of the iron-rich phase within the copper joint upon cooling.

Summarizing, there are four effects which take place to impart strength to a copper-brazed joint, i. e., the alloying of copper with iron, the alloying of iron with copper, the penetration of copper along the grain boundaries of the steel, and the grain growth across the joint.

The accumulation of these effects produces a union which, in most cases, will be as strong as the steel itself.

Industry Sets New Mark In Copper Consumption

New York, N. Y.—In consuming 45,000,000 pounds of copper during 1929, the electric refrigeration industry set a high mark in its use of this metal, according to statistics recently released by the Copper & Brass Research Association.

The previous high consumption level had been reached in 1928, with 36,000,000 pounds. Up to January 1, 1930, the industry had utilized a total of 220,000,000 pounds in the manufacture of nearly 2,500,000 refrigerators.

While production and sales in many fields have been curtailed during 1930, electric refrigeration has been steadily forging ahead. Based on preliminary data of the sales for the first six months, the industry should consume between 52,500,000 and 54,000,000 pounds of copper this year, an increase of from 15 to 20%.

The 1929 consumption of 45,000,000 pounds was the copper content of a total of 53,275,000 pounds of copper, brass, bronze, and Monel metal.

Tubing and Sheet

Seventy per cent of the copper content total was used in copper form, mainly tubing and sheet, while 28.5% went into brass castings, forgings and rods. One per cent was contained in the bronze necessary for castings and forgings, while the small balance was the copper content in the substantial amount of Monel metal, mostly in sheet form.

An increasing trend is seen toward the use of ready-made condensers and evaporators, especially the latter, because of the several companies which have specialized in producing these items. From 1927 to 1929 the poundage of copper thus consumed in evaporators rose from 100,000 to 1,900,000, with an increase of from 5,000 to 84,500 manufactured units. Similarly for condensers, poundages increased from 300,000 to 1,100,000, and the manufactured units from about 50,000 to 216,000.

Multiple Systems

The association's data shows the consumption of 500,000 pounds of copper tubing and 360,000 pounds of brass valves and fittings in the installation of multiple systems during 1929.

With multiple systems using sulphur dioxide, copper tubing lines carry the refrigerant from compressor to the various evaporators in the multiple riser systems. Such installations, which, for safety's sake, follow the single riser system, employ from 1½ to 2 times as much copper tubing as the other type.

In numerous model installations erected following the Chicago controversy, the theory of enclosing one copper line inside an iron pipe, instead of utilizing two separate iron pipe lines, was tried and has proven largely satisfactory toward eliminating the hazard of possible leaks. This step has accounted for an increase in the tonnage of copper tubing.

More Valves

Prior to 1929 a minimum of valves was placed on the refrigerant lines. In the basement, three-way forged brass valves were installed at the riser board at each point where branch refrigerant lines rose to carry up the liquid or return the gas.

From both the liquid and suction lines three-way forged brass valves were placed to carry refrigeration to and from the evaporators through the various service outlets. Where these tubes connected, various types of brass fittings were used. A miscellaneous number of fittings, switches, gauges and the like were employed in and around the compressor.

To meet the safety demands, additional shut-off, stop and check valves have been added to eliminate escape of refrigerant from any one break in the system, and also to permit complete isolation of any single evaporator.

Copper Statistics

	Total Weight	Copper Content
Raw materials purchased by refrigeration manufacturing companies for fabrication in own plants (Include copper, brass, bronze and Monel metal).....	37,450,000	32,300,000
Articles purchased ready-made to assemble:		
Condensers	1,240,000	1,100,000
Evaporators	2,150,000	1,900,000
Cabinets	4,465,000	2,575,000
Motors	4,475,000	4,475,000
Miscellaneous parts and installation equipment.....	3,495,000	2,550,000
Totals	53,275,000	45,000,000

Pound Weight of Copper and of Alloys Consumed

	Copper	Brass	Bronze	Monel metal
Raw Materials purchased for fabrication.....	24,325,000	11,625,000	400,000	1,100,000
Ready-Made Parts:				
(1) Condensers	775,000	465,000		
(2) Evaporators	1,300,000	850,000		
(3) Cabinets	3,165,000			1,300,000
(4) Motors	4,475,000			
(5) Misc. Fabricated Parts.....	500,000	2,385,000	100,000	
(6) Installation Equipment	150,000	360,000		
Totals	31,525,000	18,850,000	500,000	2,400,000

DR OP AND UPSET FORGINGS



Whatever your forging problem, in the production of mechanical refrigerators, Defco has the men and machines to deliver what you want, when you want it.

The completeness of our plant makes it good business to consult our engineers on any work you may have or plan for the future.

DETROIT FORGING COMPANY

DETROIT MICHIGAN

Members of Detroit Business Pioneers

METALS DIRECTORY

Alloys

Aetna Smelting & Refining Works.
(Special)
15 Center St., Jersey City, N. J.

Ajax Metal Co.
(Bearing)
20 Channing Ave., Malvern, Pa.

Allegheny Steel Co.
Brackenridge, Pa.

Aluminum Co. of America.
(Aluminum, Magnesium & Calcium Cop-
per)
Oliver Bldg., Pittsburgh, Pa.

American Alloys Co.
(Lead, Special & White Metal)
1943 E. Sargeant St., Philadelphia, Pa.

American Brass Co.
Waterbury, Conn.

American Platinum Works.
N. J. R. R. Ave. at Oliver St., Newark,
N. J.

Amesbury Brass & Foundry Co.
(Copper & Nickel Aluminum)
5 Water St., Amesbury, Mass.

Apex Smelting Co.
(Standard & Special Aluminum Mixtures
& Zinc Base)
2554 Fillmore St., Chicago, Ill.

Arcade Smelting & Refining Corp.
Squantum, Mass.

Bausch Machine Tool Co.
(Aluminum Billets, Slabs, Sheets, Bars,
etc.)
Springfield, Mass.

Belmont Smelting & Refining Works, Inc.
320 Belmont Ave., Brooklyn, N. Y.

Blake Foundry Corp.
(Special)
Hartford, Conn.

Bohn Aluminum & Brass Corp.
(Aluminum)
2510 E. Grand Blvd., Detroit, Mich.

Caldwell & Ward Brass Co.
(Nickel)
Syracuse, N. Y.

Calorizing Co.
(Heat Enduring, Corrosion Resisting)
Wilkinsburg Station, Pittsburgh, Pa.

Cambridge Smelting Co.
(Lead)
Cambridge, Mass.

Chase Brass & Copper Co., Inc.
(Brass, Bronze, Copper & Nickel Silver)
Waterbury, Conn.

L. A. Cohn & Br. Inc.
(Die Cast)
5429 W. Roosevelt, Chicago, Ill.

Columbia Smelting & Refining Works.
(Aluminum)
265 West St., New York, N. Y.

Curtis Bay Copper & Iron Works.
Curtis Bay, Baltimore, Md.

Dixie Brass & Foundry Co.
(Brass, Bronze, Copper, Non-Ferrous,
Resistance, White Metal)
Birmingham, Ala.

Stanley Doggett, Inc.
(Ferro)
1 Cliff St., New York, N. Y.

Driver-Harris Co.
(“Nichrome” and special alloys)
Harrison, N. J.

Eagle-Picher Lead Co.
(Lead Base)
134 No. LaSalle, Chicago, Ill.

Eisler Electric Corp.
(Molybdenum & Tungsten)
754 So. 13th St., Newark, N. J.

Electro-Metallurgical Sales Corp.
(Chromium, Manganese, Silicon, Zircon-
ium, etc.)
19 E. 41st St., New York, N. Y.

Erie Bronze Co.
1902 Chestnut St., Erie, Pa.

Fansteel Products Co.
(Molybdenum, Tantalum, Tungsten, etc.)
40 W. 22nd St., North Chicago, Ill.

Federal-Mogul Corp.
(Babbitt, Brass, Bronze, Copper, etc.)
11031 Shoemaker, Detroit, Mich.

Federated Metals Corp.
(White Metal, Die Cast, etc.)
295 Madison Ave., New York, N. Y.

Firth-Sterling Steel Co.
(Tungsten Carbide Cutting)
McKeesport, Pa.

General Alloys Co.
(Heat & Corrosion)
405 First, Boston, Mass.

Globe Metal Co.
(Aluminum)
1970 Clybourn Ave., Chicago, Ill.

Great Lakes Chemical Works.
(Special White Metal, Zinc, Tin & Lead
Base for Die Casting)
5440 W. Jefferson Ave., Detroit, Mich.

Haynes Steelite Co.
(Chromium Cobalt)
19 E. 41st St., Kokomo, Ind.

Hills-McCanna Co.
(Special, Non-Ferrous, Brass, Bronze &
Copper)
2353 Nelson St., Chicago, Ill.

Hoskins Mfg. Co.
(Special)
4435 Lawton Ave., Detroit, Mich.

I. M. Jacobson & Sons Co.
5440 W. Jefferson, Detroit, Mich.

Keokuk Electro-Metals Co.
(Ferro Silicon, Silvery Iron, Bessemer,
Ferro Silicon, etc.)
429 So. 4th St., Keokuk, Iowa.

Metal & Alloy Specialties Co., Inc.
(Aluminum, Brass, Bronze, etc.)
1879 Elmwood Ave., Buffalo, N. Y.

Metal & Ore Corp.
(Ferro)
233 Broadway, New York, N. Y.

Metal & Thermit Corp.
120 Broadway, New York, N. Y.

Metz Platinum Refining Co.
(Platinum)
42 Walnut, Newark, N. J.

Michigan Smelting & Refining Co.
(Non-Ferrous)
2512 E. Grand Blvd., Detroit, Mich.

Michigan Steel Casting Co.
(Heat Resisting)
1983 Guoin St., Detroit, Mich.

Molybdenum Corp. of America.
(Special & Ferro)
Empire Bldg., Pittsburgh, Pa.

N. E. Brass Co.
(Nickel Silver Sheets)
Taunton, Mass.

Nassau Smelting & Refining Works, Ltd.
605 W. 29th, New York, N. Y.

National Alloys Co.
(Acid Resisting, Piston, Aluminum, etc.)
2120 E. Woodbridge St., Detroit, Mich.

National Bronze & Aluminum Fdry. Co.
E. 88th & Laisy Ave., Cleveland, Ohio.

National Electric Products Corp.
(Brass & Copper)
233 Broadway, New York, N. Y.

National Lead Co.
(Antimony, Copper, Lead, Tin or Zinc
Base Metal)
1816 Trinity Bldg., New York, N. Y.

Niagara Falls Smelting & Refining Corp.
(Special Copper, Aluminum, Nickel &
Non-Ferrous)
2208 Elmwood Ave., Buffalo, N. Y.

North Western Metal Mfg. Co.
(White Metal)
1328 N. 2nd, Minneapolis, Minn.

Ohio Ferro Alloy Corp.
(Steel)
Canton, Ohio.

Park & Williams, Inc.
(Ferro, Manganese, Ferro Chrome, Ferro
Silicon)
Real Estate Trust Bldg., Philadelphia,
Pa.

Peninsula Smelting & Refining Co.
(Aluminum)
2512 E. Grand Blvd., Detroit, Mich.

Phosphor Bronze Smelting Co.
2202 Washington Ave., Philadelphia, Pa.

Pilling & Co., Inc.
(Ferro Manganese & Spiegel)
Franklin Trust Bldg., Philadelphia, Pa.

Republic Steel Corp.
(Acid & Heat Resisting Steel)
Youngstown, Ohio.

Richards Co., Inc.
(Aluminum)
377 Commercial, Boston, Mass.

Riverside Metal Co.
(Guinea Gold, Nickel, Silver, Bronze,
Phosphor Bronze, White Metal)
Keystone Bldg., Riverside, N. J.

Rogers, Brown & Crocker Bros., Inc.
(Ferrous & Non-Ferrous)
21 E. 10th St., New York, N. Y.

Seovill Mfg. Co.
(Brass, Bronze, Copper & Nickel Silver)
Waterbury, Conn.

Seymour Mfg. Co.
(Non-Ferrous, Nickel, Nickel Silver)
87 Franklin St., Seymour, Conn.

Sheet Aluminum Corp.
(Aluminum, Hyblum)
149 Cortland St., Jackson, Mich.

Southern Ferro Alloys Co.
(Ferro Silicon)
Chattanooga, Tenn.

Standard Alloys Co.
(Nickel Chromium)
1679 Colamer Rd., Cleveland, Ohio.

Standard Chemical Co.
(Ferrous)
Flannery Bldg., Pittsburgh, Pa.

Standard Rolling Mills, Inc.
(Antimony, Copper, Lead, Tin or Zinc
Base Metal)
266 Calyer St., Brooklyn, N. Y.

Stanley Chemical Co.
(Aluminum, Copper, Bearing Metal, Tin)
East Berlin, Conn.

Steel Sales Corp.
(Brass, Nickel, Steel, Bronze & Copper)
129 S. Jefferson St., Chicago, Ill.

C. Tennant Sons & Co.
(Ferro)
19 W. 44th St., New York, N. Y.

Titanium Alloy Mfg. Co.
(Ferro-Carbon-Titanium)
60 John, New York, N. Y.

Turner & Seymour Mfg. Co.
(Nickel Chromium Iron only)
100 Lawton St., Torrington, Conn.

United States Reduction Co.
(Aluminum, Ingots, Granules, Rods)
East Chicago, Ind.

United States Smelting Works
1615 Spring Garden St., Philadelphia, Pa.

Vanadium Corp. of America
(Ferro, Tungsten, Molybdenum, Vana-
dium)
120 Broadway, New York, N. Y.

Waterbury Rolling Mills
(Nickel, Silver, Bronze, Gilding, Metal,
Low Brass, etc.)
666 Watertown Ave., Watertown, Conn.

Western Automatic Machine & Screw Co.
(Open Hearth & Bessemer)
Elyria, Ohio.

E. A. Williams & Son
(Aluminum)
109 Plymouth, Jersey City, N. J.

Williams Alloy Products Co.
(Bearing)
Elyria, Ohio.

Aluminum: Sheet

Aluminum Co. of America.
Oliver Bldg., Pittsburgh, Pa.

American Nickeloid Co.
Peru, Ill.

J. T. Baker Chemical Co.
North Phillipsburg, N. J.

K. Barthelme Mfg. Co.
230 Chilli Ave., Rochester, N. Y.

Belmont Smelting & Refining Works, Inc.
320 Belmont Ave., Brooklyn, N. Y.

Fairmont Aluminum Co.
Fairmont, W. Va.

National Smelting Works.
6700 Grant Ave., Cleveland, Ohio.

Sheet Aluminum Corp.
(Chrome, Nickel, Aluminum Alloy, Hy-
blum)
149 Cortland St., Jackson, Mich.

Steel Sales Corp.
131 S. Jefferson St., Chicago, Ill.

United Smelting & Aluminum Co., Inc.
New Haven, Conn.

Williams & Co., Inc.
900 Pennsylvania Ave., Pittsburgh, Pa.

Brass: Bar and Sheet

American Brass Co.
Waterbury, Conn.

American Nickeloid Co.
Peru, Ill.

Apollo Metal Works Co.
LaSalle, Ill.

Baltimore Brass Co., Inc.
1213 Wicomico St., Baltimore, Md.

Baltimore Tube Co.
1305 Wicomico St., Baltimore, Md.

Belmont Smelting & Refining Works, Inc.
320 Belmont Ave., Brooklyn, N. Y.

Charles H. Besley & Co.
125 No. Clinton St., Chicago, Ill.

Chase Brass & Copper Co., Inc.
Waterbury, Conn.

T. E. Conklin Brass & Copper Co., Inc.
54 Lafayette St., New York, N. Y.

Revere Copper & Brass, Inc.
Rome, N. Y.

Riverside Metal Co.
Keystone Bldg., Riverside, N. J.

Seovill Mfg. Co.
Waterbury, Conn.

Steel Sales Corp.
129 So. Jefferson St., Chicago, Ill.

Waterbury Rolling Mills.
660 Watertown Ave., Waterbury, Conn.

Western Cartridge Co.
1000 Broadway, East Alton, Ill.

Williams & Co., Inc.
900 Pennsylvania Ave., Pittsburgh, Pa.

Bronze: Bar and Sheet

American Brass Co.
(Phosphor, Manganese, Tobin, Commer-
cial & Special)
Waterbury, Conn.

Baltimore Brass Co.
1213 Wicomico, Baltimore, Md.

Bunting Brass & Bronze Co.
720 Spencer St., Toledo, O.

Chase Brass & Copper Co., Inc.
(Phosphor, Commercial, etc.)
Waterbury, Conn.

T. E. Conklin Brass & Copper Co., Inc.
54 Lafayette St., New York, N. Y.

Federal-Mogul Corp.
11031 Shoemaker St., Detroit, Mich.

Arthur Harris & Co.
(Bearing Metal)
210 North Curtis, Chicago, Ill.

Johnson Bronze Co.
500 Mill St., New Castle, Pa.

Metal & Alloy Specialties Co., Inc.
1879 Elmwood Ave., Buffalo, N. Y.

M. L. Aberdorfer Brass Co.
2303 Thompson Road, Syracuse, N. Y.

Revere Copper & Brass, Inc.
(Commercial, Manganese, Naval, etc.)
Rome, N. Y.

Riverside Metal Co.
(Phosphor, Special & Commercial)
37 Franklin St., Seymour, Conn.

Seymour Mfg. Co.
(Phosphor, Commercial & Special)
37 Franklin St., Seymour, Conn.

Samet Corporation
43 Winchester Ave., Buffalo, N. Y.

Thinsheet Metals Corp.
Waterbury, Conn.

Western Cartridge Co.
1000 Broadway, East Alton, Ill.

Cadmium

American Smelting & Refining Co.
(Sulphide, Oxide, also Metal)
Equitable Bldg., New York, N. Y.

Chromium

General Chromium Corp.
3220 Bellevue Ave., Detroit, Mich.

Chromium Corp. of America
120 Broadway, New York, N. Y.

United Chromium, Inc.
51 E. 42nd St., New York, N. Y.

Copper: Bar and Sheet

American Brass Co.
Waterbury, Conn.

American Nickeloid Co.
Peru, Ill.

Apollo Metal Works Co.
LaSalle, Ill.

Baltimore Brass Co.
1207 Wicomico, Baltimore, Md.

Baltimore Tube Co., Inc.
1305 Wicomico St., Baltimore, Md.

Chas. H. Besley & Co.
125 No. Clinton St., Chicago, Ill.

Chase Brass & Copper Co., Inc.
Waterbury, Conn.

T. E. Conklin Brass & Copper Co., Inc.
54 Lafayette, New York, N. Y.

Hendricks Bros., Inc.
49 Cliff, New York, N. Y.

Revere Copper & Brass, Inc.
Rome, N. Y.

Steel Sales Corp.
131 So. Jefferson St., Chicago, Ill.

Superior Metal Co.
LaSalle, Ill.

Thinsheet Metals Corp.
Waterbury, Conn.

Copper: Tubing

American Brass Co.
(Seamless, Brased & Deoxidized)
Waterbury, Conn.

American Tube Works
10 Oliver, Boston, Mass.

Attwood Brass Works, Inc.
Grand Rapids, Mich.

Baltimore Tube Co., Inc.
(Seamless)
1305 Wicomico, Baltimore, Md.

Charles H. Besley & Co.
125 N. Clinton, Chicago, Ill.

Bridgeport Brass Co.
East Main St., Bridgeport, Conn.

R. A. Burroughs & Co.
(Seamless)
Norfolk, Va.

Chase Brass & Copper Co., Inc.
(Seamless)
Waterbury, Conn.

Clendenin Bros., Inc.
South & Lombard Sts., Baltimore, Md.

T. E. Conklin Brass & Copper Co.
(Seamless & Brased)
54 Lafayette St., New York, N. Y.

E. N. Cook Plate Co.
(Seamless)
70 Ship, Providence, R. I.

Foster Wheeler Corp.
165 Broadway, New York, N. Y.

French Mfg. Co.
Waterbury, Conn.

J. H. Jolly & Co.
42 N. 5th, Philadelphia, Pa.

Linderme Tube Co.
(Seamless)
1295 E. 53rd St., Cleveland, O.

Mackenzie-Walton Co.
(Seamless)
Pawtucket, R. I.

McKenna Brass & Mfg. Co.
1st Ave. & Ross St., Pittsburgh, Pa.

Metal Forming Corp.
Elkhart, Ind.

Michigan Seamless Tube Co.
351 West Ave., South Lyon, Mich.

Mueller Brass Co.
Port Huron, Mich.

National Electric Products Corp.
233 Broadway, New York, N. Y.

National Lead Co.
(Tin Coated, Tin Lined & Tin Covered)
1816 Trinity Bldg., New York.

Paper & Textile Machine Co.
(Centrifugally Cast)
Sandusky, O.

Penn Brass & Copper Co.
(Seamless)
1123 W. 18th St., Erie, Pa.

Revere Copper & Brass, Inc.
(Locker Seam, Seamless, etc.)
Rome, N. Y.

Rome Turney Radiator Co.
Rome, N. Y.

Seovill Mfg. Co.
(Seamless)
Waterbury, Conn.

Service Steel Co.
1435 Franklin St., Detroit, Mich.

Specialty Brass Co.
(Tinned)
Kenosha, Wis.

Steel Sales Corp.
131 So. Jefferson St., Chicago, Ill.

Steel & Tubes, Inc.
200 E. 131st St., Cleveland, O.

Summerhill Tubing Co.
Bridgeport, Pa.

United Wire & Supply Corp.
(Seamless)
1495 Elmwood Ave., Providence, R. I.

Universal Plate & Wire Co.
75 Graham, Providence, R. I.

A. H. Wells & Co., Inc.
(Seamless)
570 Watertown Ave., Waterbury, Conn.

Williams & Co., Inc.
900 Pennsylvania Ave., Pittsburgh, Pa.

Wolverine Tube Co.
(Seamless)
1491 Central Ave., Detroit, Mich.

Iron and Steel: Sheet (Black and Galvanized)

Allegheny Steel Co.
Brackenridge, Pa.

American Rolling Mill Co.
Middletown, Ohio.

American Sheet & Tin Plate Co.
Frick Bldg., Pittsburgh, Pa.

American Steel Band Co.
1400 Nixon, Pittsburgh, Pa.

Bear Steel & Wire Co.
205 W. Walker Drive, Chicago, Ill.

Berger Bros. Co.
Arch & Broad Sts., Philadelphia, Pa.

Bethlehem Steel Co.
Bethlehem, Pa.

Canonsburg Steel & Iron Works.
Canonsburg, Pa.

Columbia Steel Corp.
215 Market, San Francisco, Calif.

Continental Steel Corp.
(Steel, Flat & Formed)
1150 S. Main St., Kokomo, Ind.

Disston, Henry, & Sons, Inc.
Tacony Station, Philadelphia, Pa.

Follansbee Bros. Co.
Liberty Ave. & 3rd, Pittsburgh, Pa.

Arthur Harvey Company.
Harvey Steel Road, Boston, Mass.

Inland Steel Co.
First National Bank Bldg., Chicago, Ill.

Ingersoll Steel & Disc Co.
(High Carbon & Alloy)
Galesburg, Ill.

Jessop Steel Co.
500 Green St., Washington, Pa.

McAvoy Sheet & Tin Plate Co.
1042 W. 36th, Chicago, Ill.

Milcor Steel Co.
1435 Burnham St., Milwaukee, Wis.

Mobile Steel Co.
Mobile, Ala.

A. B. Murray Co., Inc.
155 Wolcott St., Brooklyn, N. Y.

Newport Rolling Mill Co.
9th St. & Railroad, Newport, Ky.

Newton Steel Co.
Youngstown, Ohio.

Orange Car & Steel Co.
Orange, Texas.

Parkersburg Iron & Steel Co.
Parkersburg, W. Va.

Hornace T. Potts & Co.
500 E. Erie Ave., Philadelphia, Pa.

Republic Steel Corp.
Youngstown, Ohio.

Jos. T. Ryerson & Son, Inc.
Chicago, Ill.

Scully Steel & Iron Co.
Ashland Ave. & 24th St., Chicago, Ill.

Seneca Iron & Steel Co.
Lake Ave., Bladell, Buffalo, N. Y.

Standard Tin Plate Co.
Canonsburg, Pa.

Stulz-Sickles Co.
140 Lafayette St., Newark, N. J.

Tennessee Coal, Iron & Railroad Co.
Birmingham, Ala.

Wheeling Corrugating Co.
Wheeling, W. Va.

Wheeling Metal & Mfg. Co.
Wheeling, W. Va.

Weirton Steel Co.
Weirton, W. Va.

Iron and Steel Sheet: Rust Resisting Non-Corrosive and Stainless

Allegheny Steel Company.
Brackenridge, Pa.

American Nickeloid Co.
Peru, Ill.

American Rolling Mill Co.
Middletown, Ohio.

Carpenter Steel Co.
Reading, Pa.

Colonial Steel Co.
Grant Bldg., Pittsburgh, Pa.

Columbia Tool Steel Co.
Chicago Heights, Ill.

Continental Steel Corp.
1150 S. Main St., Kokomo, Ind.

Duraloy Company.
So. 26th St., Pittsburgh, Pa.

Firth-Sterling Steel Co.
McKeesport, Pa.

Halecomb Steel Co.
Syracuse, N. Y.

Inland Steel Co.
1st National Bank Bldg., Chicago, Ill.

Jessop Steel Co.
500 Green St., Washington, Pa.

Latrobe Electric Steel Co.
Latrobe, Pa.

Ludlum Steel Co.
Watervliet, N. Y.

Midvale Co.
Nictown, Philadelphia, Pa.

Newport Rolling Mill Co.
9th St. & Railroad, Newport, Ky.

Republic Steel Corp.
Youngstown, Ohio.

Rustless Iron Co. of America.
Loneys La. & Pa. R. R., Baltimore, Md.

Jos. T. Ryerson & Son, Inc.
Chicago, Ill.

Scully Steel & Iron Co.
Ashland Ave. & 24th St., Chicago, Ill.

United Alloy Steel Corp.
1038 Belden Blvd., N. E., Canton, Ohio.

Universal Steel Co.
Bridgeville, Pa.

Vanadium-Alloy Steel Co.
Latrobe, Pa.

Vulcan Crucible Steel Co.
Altiquippa, Pa.

Youngstown Sheet & Tube Co.
Youngstown, Ohio.

Silver: Solder

Makepeace Co. Corp.
Attlesboro, Mass.

Handy & Harman.
57 William St., New York, N. Y.

A. T. Wall Co.
(Sheet, Rod, Wire, Burred)
159 Clifford St., New York, N. Y.

Monel Metal

International Nickel Co.
67 Wall St., New York, N. Y.

Nickel: Sheet

American Nickeloid Co.
Peru, Ill.

Apollo Metal Works Co.
La Salle, Ill.

H. Boker & Co., Inc.
Duane St. & Broadway, New York, N. Y.

Driver-Harris Co.
(Alloy)
Harrison, N. J.

International Nickel Co., Inc.
67 Wall St., New York, N. Y.

Steel Sales Corp.
129 So. Jefferson St., Chicago, Ill.

Superior Metal Co.
La Salle, Ill.

Whitehead Metal Products Co.
304 Hudson St., New York, N. Y.

Williams & Co., Inc.
900 Pennsylvania Ave., Pittsburgh, Pa.

Tin: Sheet

American Nickeloid Co.
Peru, Illinois.

American Sheet & Tin Plate Co.
Frick Bldg., Pittsburgh, Pa.

Apollo Metal Works Co.
La Salle, Illinois.

Illinois Smelting & Refining Co.
Peoria & Kinzie Sts., Chicago, Ill.

National Lead Co.
1816 Trinity Bldg., New York, N. Y.

National Sheet Metal Co.
Peru, Ill.

Standard Rolling Mills, Inc.
266 Calyer St., Brooklyn, N. Y.

Zinc: Sheet

American Cyanamid Co.
535 5th Ave., New York, N. Y.

American Nickeloid Co.
Peru, Ill.

American Zinc Products Co.
Greencastle, Ind.

Apollo Metal Works Co.
La Salle, Ill.

Associated Metals & Minerals Corp.
40 Rector, New York, N. Y.

Atlantic Zinc Works, Inc.
52 Vanderbilt Ave., New York, N. Y.

Ball Bros Co.
Muncit, Ind.

Bayonne Steel Products Co.
Clinton & Jelliff Aves., Newark, N. J.

Belmont Smelting & Refining Works, Inc.
320 Belmont Ave., Brooklyn, N. Y.

Clendenin Bros., Inc.
South & Lombard Sts., Baltimore, Md.

Illinois Zinc Co.
332 S. Michigan Ave., Chicago, Ill.

Mathiessen & Hegeler Zinc Co.
La Salle, Ind.

National Sheet Metal Co.
Peru, Ill.

New Jersey Zinc Sales Co.
Front & Fletcher Sts., New York, N. Y.

Sandoval Zinc Co.
410 N. Peoria, Chicago, Ill.

Sterling Products Co.
Wilkinson Rd., Easton, Pa.

Superior Metal Co.
La Salle, Ill.